



FRIDAY, JAN. 13, 1893.

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Contributions.

Sodium Fluoride.

NEW YORK, Jan. 11, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

We notice in your issue of the 6th inst. a very ably-written article on "Feed Water and Boiler Incrustations," and, while we are much pleased by the praise given to our compound, Sodium Fluoride, we take exception to the statement that the cost prevents its being put into practical use, as we have had it in the market now for over a year in this country, and our price is lower than any other compound that will do the work.

AMERICAN FLUORIDE CO.

Legislation for Safety—Why Longer Oppose?

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have just been studying the advance sheets of the report of the Iowa Railroad Commissioners for last year, 1892, and as I looked over the list of killed and injured in that state, and taking fully the meaning of the Commissioners in their comments upon the sad statistics given, the question "why longer oppose" involuntarily arose to my lips. Eighty employes killed, 42 of these from couplers and brakes; over half from the two causes which every candid man at all conversant with the practical working of trains will admit can be prevented by the observance of a wise law requiring automatic couplers and power brakes. Five hundred and eighty-seven employes also injured in 1892 in Iowa, and 250 of these from the same two causes. It is safe to say that, take the nation over, at least 50 per cent. of all the casualties to railroad employes come from these two causes alone.

At the annual convention of the Association of Railway Surgeons, at Old Point Comfort, last spring, the astounding fact was brought out that not less than the awful number of 31,000 railroad employes met with death or injuries that required the assistance of these surgeons. These surgeons, of course, have a chance to get the correct number. Here are not less than 6,000 yearly casualties above any number stated by any other authority.

Again I ask, is not the question, "Why longer oppose" a reasonable law for the most speedy equipment practical of all freight cars with the safest uniform type of coupler known and with power brakes, in regard to which latter there is now no longer any doubt as to their availability, a pertinent and reasonable one? I put this question to the railroad managements of this nation. With this question allow me to ask some others. Is there a manager of any considerable line of road who is not by this time convinced that it would be economy and saving if every train on his road was equipped with power-braked cars sufficient to enable the engineer at all times to have full control of his train? Is there a single manager in the nation but will admit that were our freight cars fitted with some self coupler of a uniform type, it would lessen, at the very least, by 50 per cent. the deaths and injuries now suffered by employes in coupling and uncoupling cars? Would it not be good policy, to say nothing at present of the right and humanity of the question, to listen to the unanimous voice of all the railroad employes in this country engaged in train service, especially when they, as one man, ask that these safety appliances shall be given them in their work, hazardous at the best? The great Brotherhood of Locomotive Engineers, numbering over 80,000 men;

the Brotherhood of Locomotive Firemen, some twenty odd thousand more; the Order of Railway Conductors, from 25,000 to 30,000 more; the Brotherhood of Railway Trainmen, nearly 20,000 more—all of these in their conventions, by unanimous resolutions adopted, have asked Congress for relief in these matters. I hold in my hands letters from the grand officers of all these organizations urging me to press the necessity upon Congress for a national law requiring these safety appliances.

I ask again the managers of the railroads of this nation, Is it wise to ignore longer the wishes and reasonable demands of this army of brave, faithful men who run your trains and make it possible for the property to return some income? Is not the handwriting already seen on the wall? Is it not now only a question of time when this work will be done? The leading roads of the nation are doing grandly now, but do we not all know that there are many roads which will not spend a dollar in this direction until there is a "thus saith the law"?

There is a very good bill now on the Senate calendar. This bill, in the main, meets the views of many of the leading managers—if, as they say, "any law is to be enacted." This bill will be passed into law if the railroads will withdraw opposition. If not enacted into law it will be because the roads oppose.

Now comes another question: Do the roads wish to stand before the country as more careful of a few dollars, expenses than they are of the lives and limbs of their faithful employes?

There will be no trouble in getting laws enacted, similar to the Iowa laws, in all the states if desired. This is not wanted except as a last resort. Congress is the proper body to act; we want a uniform regulation. Can the managements blame us if, failing here because of their opposition, we turn to the states for laws?

L. S. COFFIN.

A Few Wrinkles in Track Laying.

LYNCHBURG, Va., Jan. 5, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A few months ago the grading for the mile and a third connection, extending our division to the main line, was completed and ready for the track laying. Like all similar kinds of railroad work, this track, though only some 7,000 ft. long, was to be laid and ready for the regular traffic in the shortest possible space of time, the question of expense, of course, being a consideration. Unfortunately, the delivery of the steel was delayed, and this only made matters the worse for us, as the delay in the shipments of the steel naturally curtailed the time in which it was desired to complete the work.

After some deliberation I laid out a plan of procedure which would not only reduce the time of laying and completing the track, but which would also bring the cost down to the minimum. Owing to the location having been made down a narrow ravine, the roadbed was inaccessible to wagons, except at one end of the line, and in consequence the ties had to be hauled from that end over the graded way. The foreman in charge of the placing of the ties was furnished with a stick having one end pointed, and of a length equal to the distance from centre to centre of three ties spaced in track. Roughly laying this distance off with his stick, he would then make a scratch or mark on the roadbed in about the position that a tie would lie when in track, and near the line side of the ties. Having previously measured the distances from a few of the centre stakes to points in and corresponding with the line side, and having placed small pegs or stones to indicate these points, he would scratch a mark across his first mark, about at right angles thereto, lining this mark by his eye, getting line by means of the pegs or stones just described, thus indicating the exact position of the tie in the track. All that the laborers had to do was then to drop the tie so that one end coincided with the cross mark, and the centre of the tie with the mark first made, and the tie would then be in its final position, properly spaced and showing comparatively good line. The intermediate or second tie was then placed between the first and third ties, without any marking on the ground, this not being necessary, as its correct position could be accurately defined by sight. All of the ties now having been placed according to this manner, and the rail not yet being at hand, we proceeded with our next step.

Having made a gauge of wood in the form of a double tee, and of a length equal to the distance from the centre of the outside spike to the outer end of the tie, line side, each tie was marked off with a pencil, thus indicating the position of the outside spike. A gang of five spikers, in charge of a foreman, was then put to work driving the outside spikes, but not bringing them home by about three-quarters of an inch. We had intended that this should be all of the spikes that we would drive before placing the rail, but as the steel had not yet been received, we determined to go further in our experiment. Carefully calculating the distance between the inner edge of the spikes already driven and the centre of the other row of outside spikes yet to be driven, a wooden gauge was then constructed of a length equal to exactly this distance. The ends of the gauge were beveled down to one-quarter of an inch and protected by metal shoes. One end of this gauge was then placed against the inner edge of the outside spike on every third tie, and with a small scribeawl a delicate mark was made, showing the position of the centre of the

spike of the opposite outside, or gauge, row. As this line was purposely made rather faint, the position of the line was indicated by making a ring or small circle, with a lumberman's pencil, at the point where the spike was to be driven. A moment's glance at the ring would enable the spiker to discover the scribe mark and then the spike would be driven on this line. It was certainly astonishing with what rapidity and accuracy the spikes were driven; and out of the total number of 5,550 spikes so driven, but seven spikes had turned out of their true position while driving.

As is well known, no matter how nicely a piece of roadbed has been graded, it will show a bad surface when the track is laid. As schedule speed was desired as soon as our track was laid, we were determined that the surfacing should be completed simultaneously with the completion of the track laying, and this was to be accomplished without an additional force; and again it would not do to run any risk in the matter, as it might happen that the surfacing could not be accomplished at all, within the given time, no matter how large the force, should the steel come at such a time as to make track laying by night (which, in fact, was done) necessary, so we devised a plan which would be given a trial at least, the rail not yet being on the ground.

A number (about six) of 1½ x 10 in. planks were secured, 30 ft. long; and placing these on their edges in the same positions on the ties which the rails would occupy in the track, all those ties which did not surface, or which were below the bottom edges of the boards, were lifted with a pick placed under the tie, until the ties touched the bottom of the boards, when the men would shovel and tamp under the ties the material composing the roadbed. We were extremely fortunate in this respect, as the final ballast was to be engine cinder, and the roadbed was composed of a sandy and micaceous soil, this latter material would therefore form an excellent base for the cinder. As soon as a distance of 30 ft. (one length of the plank) of the ties was surfaced by this method, the planks would be moved forward and the operation repeated, until the whole line was surfaced in this manner. A foreman at the forward end of the plank could thus easily guide the same so that the surface, taken as a whole, showed a remarkable uniform grade.

The consignment of steel having now arrived, the rails were put down rapidly, the men pressing them hard against the spikes while putting them into position, this tending to bring all of the spikes into their proper position against the outer base of rail. What few ties were previously slightly shifted out of their position were readily placed where they belonged by one blow of the hammer, the spikes previously driven bringing up against the rail, and not allowing the tie to move farther than into its correct position.

By this method of surfacing and the first driving of the spikes, time and consequently money were saved in various ways particularly as follows: In narrow cuts and sometimes on fills, when laying track the ordinary way, it is a difficult matter to secure a heel whereby the tie is kept up to the rail while being spiked, and even when a heel can be secured it generally yields a great many times before the spike is driven home; and again, when the tie is lined by means of measuring with a pick handle and drawing the tie with a pick inserted in the wood, it is not once in a hundred times that the tie stops where it is desired, but is see-sawed, back and forth, thus killing time in no small proportion when working a large force, not to say anything of the injury to the tie from the numerous holes made with the pick. In laying the rail the precaution was taken to have the men drive the inside spikes first, and by so doing no trouble whatever was experienced and the gauge was perfect. We had a force of 60 men, and with most of the laying by night under a light made by ordinary torches, and the unloading of the steel having by necessity been made from the end of the car, these rails were put in place, full spiked throughout, in the actual time of 16 hours.

We therefore had the gratification of accomplishing what we had started out to do, having a surfaced piece of track ready for trains at schedule speed as soon as the last rail was laid. It was but the work of a few hours to fill the entire track with cinder from the hopper-bottom cars. The final ballasting was then concluded at our leisure, of course, without any interference with the running of trains at schedule speed.

THEO. LOW, Superintendent Durham Division,
Norfolk & Western R. R. Co.

The 155th Street Viaduct and the Seventh Avenue Drawbridge New York City.

BY W. G. TRIEST, JUN. AM. SOC. C. E.

The management of the American Society of Civil Engineers proposes a visit to the viaduct and the draw bridge, which are now under construction at 155th street and Seventh avenue, New York, as one of the excursions of the coming annual meeting. The following notes on the two structures may be of special interest to those members who go to see the work.

The location of the 155th street viaduct and of the Seventh avenue or Central Bridge is shown on the accompanying little map. The viaduct will connect Washington Heights with the present terminus of the West Side elevated system, Seventh avenue, the Harlem River and Westchester County. A heavy traffic is expected to go up the viaduct from the docks at Exterior street.

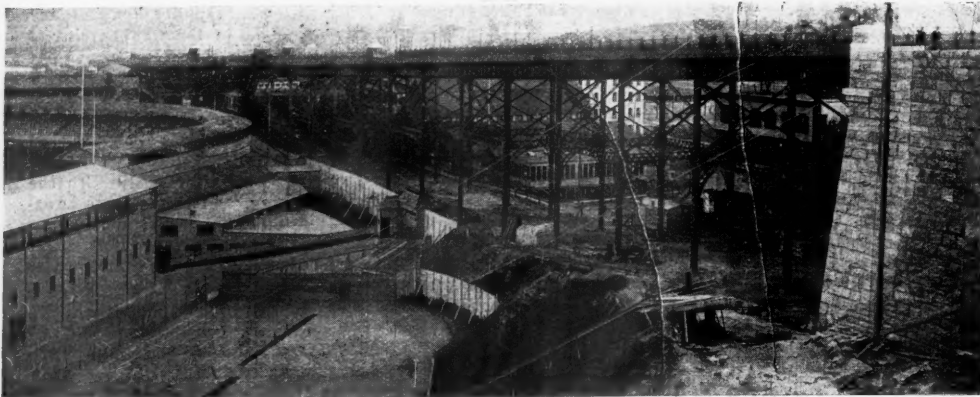
The new bridge is to replace the old Macomb's dam bridge, which had become insufficient, as a large part of the traffic from the island part of the city goes over this bridge. At present there is no wagon bridge over the Harlem between the Madison avenue draw and Washington bridge, a distance of 2½ miles.

plates and angles, and single latticed on the side toward the sidewalk. They rest on Portland cement concrete piers, partly directly on rock and partly on pile foundations.

The columns support cross girders 6 ft. 10 in. deep, which in their turn carry five rows of longitudinal

girders 4 ft. 4 in. deep and spaced 10 ft. between centres; 16-in. floorbeams, 4 ft. 4 in. centre to centre, rest on the stringers and are flush at the top with the top of the cross girders. They support the ¾-in. buckle plates, which are manufactured in sheets 20 ft. long, with five dishes in each. The rise of the dish is 3 in. in the centre. The roadway is 40 ft. wide, requiring two sheets transversely. Two sidewalks of 10 ft. 6 in. each overhang the outside longitudinal girders, and are carried by the overhang of the 16-in. beams. There is an expansion joint at the upgrade end of every open span, the longitudinal girders moving on roller nests of cold-rolled steel bars 2 in. diameter. These bars are so true round, that it was found unnecessary to turn them. The superstructure is of soft, open-hearth steel.

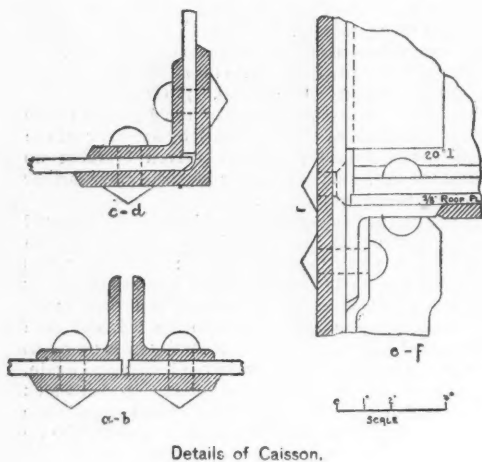
The upper surface of the buckle plates is thickly painted with roofing tar composition applied hot. On the bottom so prepared is spread a bituminous concrete, in which the 3-in. crown of the strut is formed. The minimum thickness of this concrete over the dome of the buckle plates is ¾-in. The concrete for the roadway is composed of 1 gal. roofing composition No. 4 to 1 cu. ft. ½-in. broken stone, and the concrete for the sidewalk consists of 1 gal. fluid mixture to 1 cu. ft. of ½ in. broken stone. The fluid mixture is 1 lb. Lima tar to 5 lbs. Trinidad. The bituminous concrete on the roadway is then sprinkled with sand, rolled so as to fill all the interstices and form a smooth surface. On this is spread a layer ½ in. thick of mastic, to give a waterproof



The 155th Street Viaduct—New York City.

The government exacted a crossing of the river at right angles, which necessitated a deviation from the location of the old draw. To allow the building of the new bridge, the old wooden draw was moved bodily up stream to a site shown on the map. This was described in the *Railroad Gazette* of Aug. 19, 1892.

The viaduct starts from an abutment at Edgecombe road, 60 ft. above street grade, goes down 155th street with a grade of 4½ per cent., crosses the Eighth avenue elevated station by a level plaza, 48 ft. above grade, and connects at Exterior street with Macomb's Dam road and the Seventh avenue draw by a triangular plaza 28 ft. above the street. Staircases on both sides of Eighth



Details of Caisson.

avenue connect the viaduct with the elevated road. Access to the draw from Seventh avenue will be by 158d street.

The viaduct is 1,400 ft. long with 15 spans of 43 ft. 4 in. west of Eighth avenue, one span of 69 ft. over the avenue, 15 spans of 42 ft. 10½ in. east of the same, and three spans of 54 ft. over Exterior street. The spans are alternately open and braced. The bracing consists of latticed struts and of latticed angles. The columns are spaced 40 ft. transversely, are 18-in. square, built of

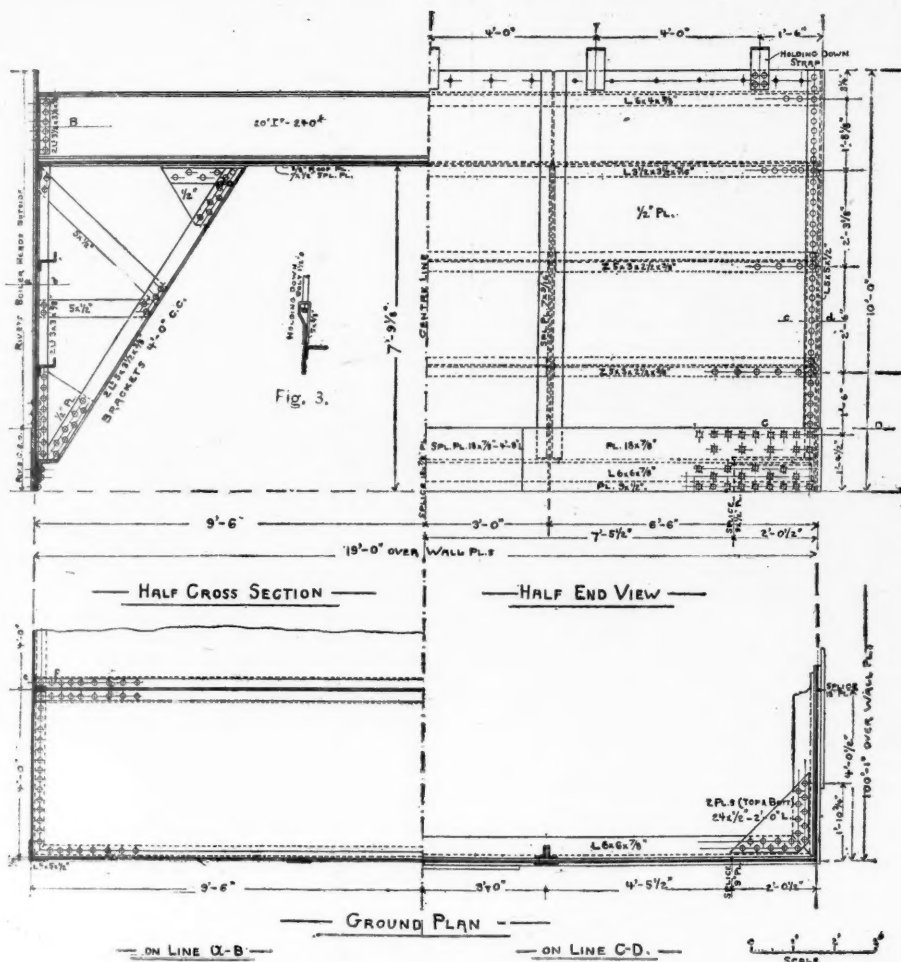
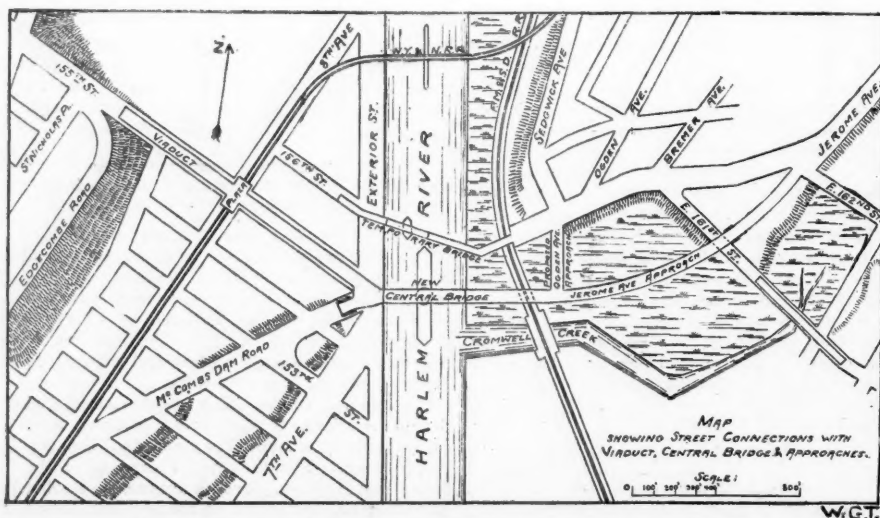


Fig. 2—Caisson for Pier 1, Seventh Avenue Drawbridge.



Site of the 155th Street Viaduct and Central Bridge—New York City.

covering to the more or less porous concrete. The proportions of the mastic are 80 lbs. Seyssel, 600 lbs. rock asphalt and 9 to 12 pails of sand, more sand being used for the top layer. The roadway surface is formed of granite paving blocks not exceeding 6 in. in depth and 3½ to 4 in. wide, bedded in a layer of sand 1 in. thick. Into the joints of the stones hot gravel is brushed, and the crevices are then filled with hot paving cement, composed of 20 parts of refined Trinidad asphalt and three parts of residuum oil, with 100 parts of coal tar. The roadway is bounded on either side by a dressed blue stone curb 3½ in. wide. The finishing surface of the sidewalk consists of a coating 1 in. thick of the above mastic. Trinidad asphalt is used for the sidewalk mastic instead of Seyssel. The bituminous concrete has been laid continuously over the expansion joints, the ductility of the asphalt being relied on to make the concrete conform itself to the varying width of the joints. No cracks have developed so far.

The abutments are second-class ashlar masonry, with Sandy Hill limestone, and Maine granite is used for the cut coping, weatherings and belt courses. The backing is rubble work and concrete. One flight of 112 granite steps leads from 155th street along the north side of the upper abutment to St. Nicholas avenue, and two flights of steps flank Macomb's Dam abutment. The railing has

ornamental cast iron newels every 4 ft., with cast iron panels in the lower half and rich scrollwork in the upper half of the railing. A 3-in. gaspipe serves as handrail. The viaduct is lighted by gas.

The draw is 408 ft. 6 in., c. c. endpoints, with 18 panels of 21 ft. 3 in., and a centre panel of 26 ft. The trusses are 43 ft. 6 in., c. c., and the distance c. c. hand railings is 65 ft. The centre posts are 62 ft. 6 in., c. c., and the end portals give a clearance of 18 ft. The paving will be an asphaltum pavement laid on buckle plates. The side-walks are also to be of asphalt. The east approaches consist of two 100-ft. deck lattice spans, one 219 ft. through riveted span over the right of way of the N. Y. C. & H. R. R., and of 9 deck lattice spans of 98 ft. 10 in., c. c., east of the railroad. These latter are on a curve of 1,500-ft. radius and lead to an abutment at 161st street. From this point they are continued by an embankment, 450 ft. long, between mortar retaining walls, to Jerome avenue, at 162d street. A further approach is contemplated from Ogden avenue.

The river bed is a thin layer of silt overlying the bed rock, which is found at elevations from 26 to 36 ft., below datum, M. H. W., for the draw rest piers and the

nal, built of timber, giving a minimum width of 8 ft. to the working chamber. The roof of the working chamber is of timber, and will be cut out after the filling of the chamber, so as to secure a better unification of the concrete inside and above of the working chamber. The coffer-dam is of timber. Rock is found at the pier site at -28 ft. The foundation for the east draw rest pier has been built inside of a coffer-dam of 12 x 12-in. sheet piling. To the timber planed strips $3\frac{1}{2} \times 2\frac{1}{2}$ in. were spiked, forming a tongue and groove. The sheet piling was driven by blows of an 1,800-lb. hammer so as to just touch rock, which is at depths varying from 28 to 36 ft. below datum. Difficulty with water was encountered only at the southeast corner of the inclosure, where a layer of sand overlies the rock. The sand was drawn by the pumps from under the edge of the sheet piling in large quantities, and caused an adjoining platform to settle several feet.

The piers for the approach spans are twin piers, built on separate foundations. The pneumatic foundations for the two piers east of the draw are double also. The piers east of the railroad are founded on piles. The piers will be of limestone up to the surface, where the

that they have become convinced the statements are correct; for an investigation of the physical conditions of the channel to be improved, and of the locations of the proposed improvements will convince any one familiar with the laws of flowing water that no expert testimony is needed to establish the fact that the improvements when completed will have no appreciable effect on the level of the lakes and the connecting channels.

It is probably true that the results promised by the promoters of the scheme will not be realized by the completion of the work as now planned, and that larger appropriations will be asked for to increase the depth of local ports to that proposed for the main channel. These results, however, will by no means arise from any decrease in the natural lake levels due to the improvements. In fact, the only improvements on the route that will cause any appreciable effect in lowering the water surfaces of the connecting waterways have already either been completed or are under contract and soon will be.

The mean levels of the lakes above mean tide at New York are:

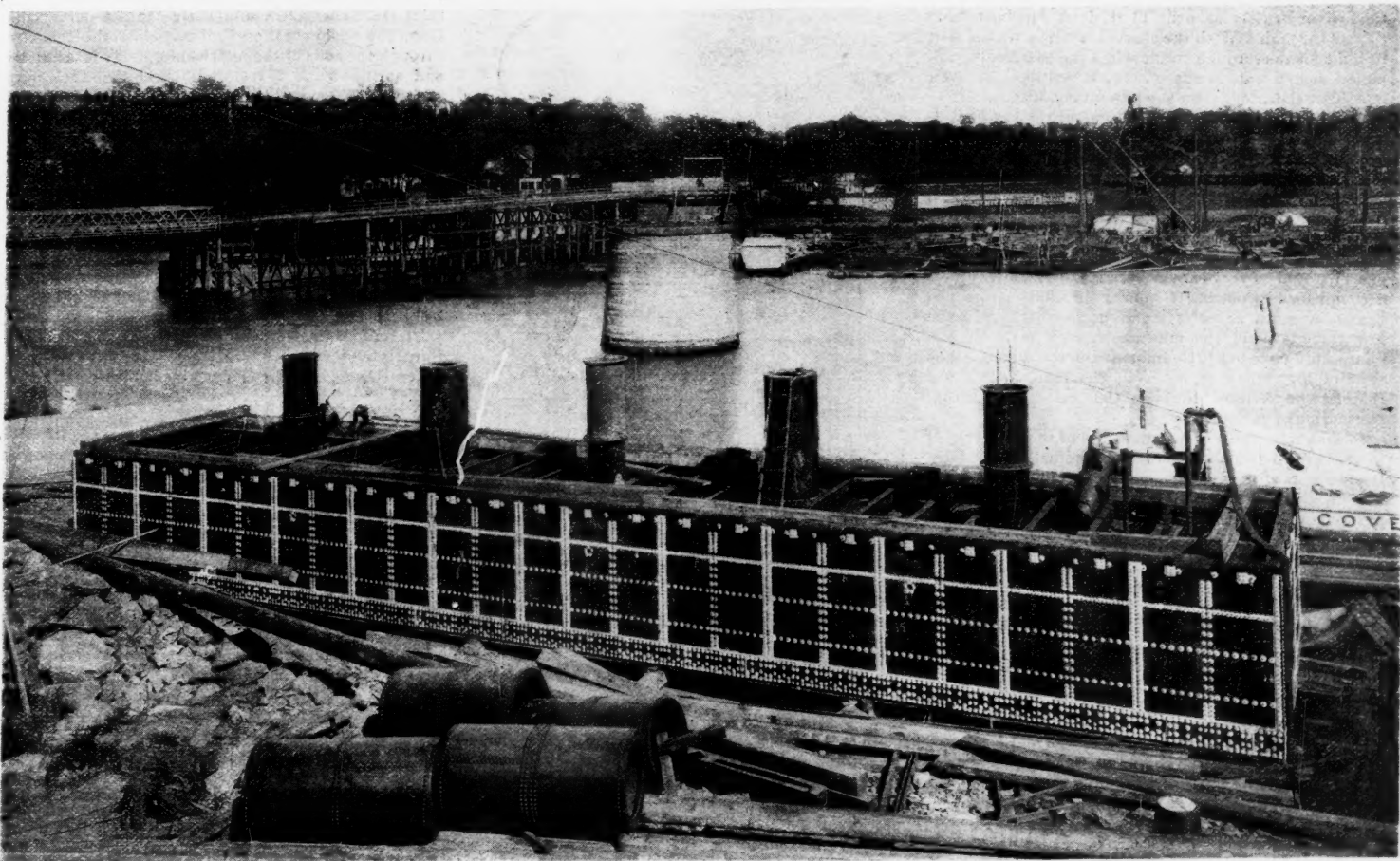


FIG. 1—CAISSON FOR PIER 1—SEVENTH AVENUE DRAWBRIDGE, NEW YORK.

Mr. A. P. BOLLER, M. Am. Soc. C. E., Chief Engineer.

pivot pier. The rock pitches off very rapidly east of the river. The borings show it to be 50 and 98 ft., respectively, at the site of the first two piers east of the draw. Gradually it rises again and appears at the surface at the 161st street abutment. Over the rocks are layers of quicksand, peat, micaceous clay and about 25 ft. of black mud. Sufficient sand for pile foundations was found only east of the railroad. These conditions necessitate pneumatic foundations for the west draw rest pier, or pier I., for the pivot pier and for the two approach piers next to the river. The engraving, fig. 1, made from a photograph, shows the caisson for pier I., with the two large shafts for the air locks and the smaller excavating and material shafts. Fig. 2 gives a half cross section, a half end view and a part of the ground plan.

The caisson is 100 x 19 ft. wide and 10 ft. high; it is built of soft steel and manufactured by the Passaic Rolling Mill Co. The cutting edge is reinforced by an inside timber. The caisson is surmounted by a cofferdam of 12 x 12 in. timber. The first course of it is bolted to the caisson, and the following courses are drift-bolted to the bottom course and held, additionally, by 60 rods, secured to straps, as shown on fig. 2. Rock was reached on its entire west side at -30', and the foundation was carried to rock on the east or bulkhead side by pocketing several feet below the cutting edge. For the removal of the excavated material out of the working chamber the new Moran excavating lock was successfully used. The working chamber is filled with Portland cement concrete, with which also the roof of the caisson is covered up to 6 in. above the roof beams, from where the stone work starts.

For the pivot pier an annular caisson has been constructed. The outer shell is circular, with a diameter of 59 ft., built of soft steel, and the inner wall is octago-

granite work begins. The body of the piers is to be dark, relieved by a light granite for coping, belt and weathering courses. The superstructure will be of soft steel.

The whole work is built to the design and specification and under the supervision of Mr. Alfred P. Boller, M. Am. Soc. C. E., whose assistant the writer is. The viaduct is under the jurisdiction of the Department of Public Works, and the draw and east approaches are under that of the Department of Public Parks. Mr. Martin Gay, M. Am. Soc. C. E., acts as Resident Engineer for both departments. The contractor for the viaduct is Herbert Steward, with the Union Bridge Co. as sub-contractors for the super-structure. The contractors for the draw and east approach are the Passaic Rolling Mill Co., with Steward & McDermott as sub-contractors for the masonry. The pneumatic work is done by Sooy-Smith & Co., under the superintendence of Mr. George Thomas. The cost of the viaduct is estimated at \$650,000 and of the draw and east approach at \$1,250,000. The whole work is expected to be completed by the spring of 1894.

Effect of the Deep Water Channel on the Lake Levels.

BY GEORGE Y. WISNER.

In recent interviews with Congressmen and others, it has been stated that the 20-foot channel from Duluth to Buffalo, when completed, will lower the level of the lakes to such an extent that many of the local lake harbors will be practically ruined unless again deepened by the government at great expense. The sincerity with which these statements have apparently been made can be accounted for only on the supposition that the relators have heard and told the stories so often

	Elevation. Ft.	Dif. in level. Ft.
Lake Superior.....	601.8	...
Lake Huron and Michigan.....	581.3	20.5
Lake St. Clair.....	575.9	5.4
Lake Erie.....	572.9	3.0
Lake Ontario.....	246.6	326.3

The location of the shoals where the improvements are to be made under the contracts recently awarded is as follows: Near Round Island, at the foot of Lake Superior, where the natural channel is $2\frac{1}{2}$ miles wide, with practically no slope to the water surface, and, consequently, the deepening required will cause no change whatever in the surface levels. The next shoal to be improved is in St. Mary's River, the greater portion of which is at Mud Lake, where the natural channel is wide and the slope small, and will have but little effect compared with the new Hay Lake channel, now nearly completed, which shortens the navigable channel about 12 miles.

As will be seen from the table above, Lake Huron is 20.5 ft. lower than Lake Superior, of which 18 ft. are in the rapids at the Sault, leaving only $2\frac{1}{2}$ ft. for the slope of over 50 miles of river below. That the deepening and shortening of this channel will lessen the slope of the river, no one will question, but it is evident from the low slope that already exists that it cannot at most amount to more than one or two inches, and will have the effect of lowering the depth on the lower mitre sill of the Sault lock that amount.

The next location where the channel is to be deepened is at the lower end of Lake Huron, in the open lake, and as there is no slope the effect of the improvement will be nothing. The next section to be improved is at the delta of the St. Clair River, in Lake St. Clair. The distance through which the slope will be changed is less than two miles, with a natural slope of less than two

inches a mile, and consequently the change cannot exceed two inches, and will merely reduce the stage of the river a like amount as far up as the foot of the rapid at head of river. The next section is in Lake St. Clair, near the head of Detroit River, and as the excavation of the bed of the lake can produce no change in surface level, no injurious results need be feared. The next reach to be improved, which completes the series, is in Lake Erie, at the mouth of the Detroit River, and, like the preceding, merely amounts to deepening the bed of the lake. The improvement of the Detroit River at the Lime Kiln crossing, which has already been completed, undoubtedly has a tendency to lower the natural slope, but as the length of the improved section is only one-half mile, the change at most cannot amount to one inch.

It is therefore evident that when the proposed improvements are completed the change in the water levels due to the works cannot in any case exceed two inches, which, where the natural fluctuations of the surfaces amount to over four feet, would not be a measurable quantity.

The weak feature of this plan for producing a 20-ft. channel is that the fluctuations of the water surface of Lake Erie are such that there may be several days at a time when vessels of over 16 ft. draft will be unable to pass through. With the class of vessels which will be built for the through traffic when the channel is completed, such a state of affairs will, if possible, be even more unsatisfactory than the present conditions.

From 1865 to 1875 the surface of Lake Erie was considerable of the time from one to two feet below mean lake level, and as a strong westerly wind lowers the water level at the head of the lake from one to three feet it is easy to see that a channel of 20 ft. at mean lake level will by no means insure a navigable channel of anywhere near such depth. The head of Lake Erie is so shallow that to overcome this difficulty by dredging the channel deeper would be very expensive. It may, however, be accomplished by placing a submerged dam across the head of Niagara River of sufficient height to raise the low water level of the lake about two feet. Such a dam would have but little influence on the lake level at time of high stage of water in the lake, and would therefore materially diminish the amount of actual fluctuation of surface.

To thus raise the low water surface of the lake would increase the depth of the entrance channels of the local lake harbors a like amount, and as the improvement of these harbors is likely to cost much more than the main 20-ft. channel in Lake Erie, the saving that may thus be effected may be worth considering.

DETROIT, Jan. 9, 1893.

Hall Automatic Block Signals on the Chicago & Northwestern.

The Hall Signal Company has lately put in a large number of its wire circuit electric block signals on the above named road, and we print herewith a diagram of the circuits as used in those signals. The main principle is the same as that in the simple signal circuit shown in the *Railroad Gazette* of June 13 and Sept. 12, 1890, but there are several additional patents on the arrangement as here shown. The relays and interlocking instruments are placed in the battery houses. The general appearance of the signals is shown in figs. 2 and 3, which are explained by their titles. The small upper opening in the signal case is for the night signal, the lamp being placed back of this instead of behind the main opening, as in the older forms. The arm carrying the disc for the day signal carries at its opposite end a red glass disc which is moved to or away from the small opening in the same way that the cloth disc is moved to or away from the main opening.

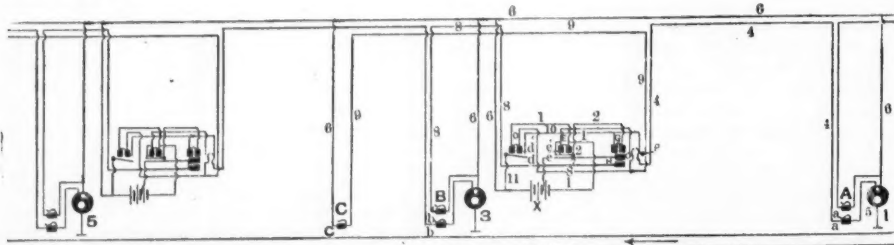


Fig. 1—Electrical Connections for Hall Automatic Block Signals on Chicago & Northwestern Railway.

Fig. 3 shows the form of post used for most of the signals on the Chicago & Northwestern. It is taller than the older pattern, and, as will be seen, presents a more graceful appearance. The case, which makes the background for the disc, is, for distant signals, painted white. Our illustration (fig. 3) is intended to indicate a green disc in a white case, the common style of the Hall Company, but on the Chicago & Northwestern, where the color green is used to indicate "all clear," the disc is different from this. It consists of a green ground crossed diagonally by two white stripes, at right angles to each other, about 1½ in. wide. For the night caution signal the arrangement is the same as in the semaphore signals (shown in the *Railroad Gazette* of May 8, 1891), that is, a green light for all clear and a red and a green side by side for caution.

In fig. 1 is shown the arrangement of wire circuits used for the operation of the signals. It will be seen that it is necessary for a train to perform two distinct operations to return the signal to clear. This arrangement is to protect a train passing into a section, while a preceding train may have stopped over the clearance instrument, and it also provides for the protection of a train should it overrun the block track instrument. Also, if a train enters a section past a danger signal (after waiting a given time interval according to the rule) and the first train is at the time passing out of the section over the clearance instrument, it will not clear the signal behind the second train.

In the diagram the circuit is as follows: From battery X, wire 1, through magnets and points of block relay E, wire 2, magnets G, and closed spring p, of interlocking relay, block line wire 4, closed track instrument spring a, wire 5, through the magnet of signal instrument, back to battery by wire 6. When the train enters the block section governed by signal No. 1, the first wheels open spring a, of block track instrument A, breaking the signal circuit by demagnetizing block relay E. The

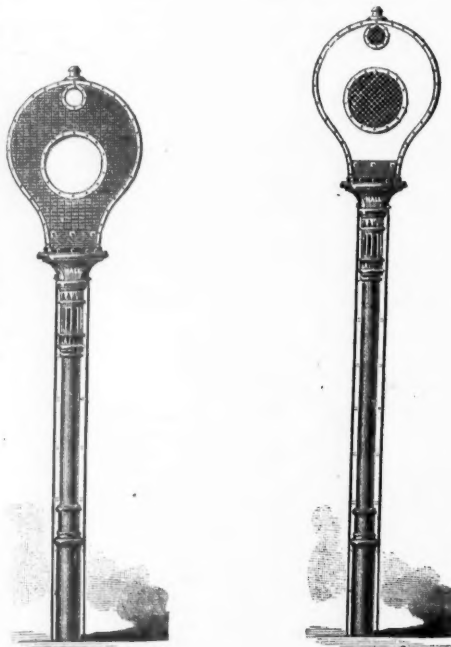


Fig. 2—Home Signal, Showing All Clear.



Fig. 3—Distant Signal, Showing Caution.

Hall Automatic Signals.

signal circuit is therefore permanently open, by the opening of points e and e¹.

When the train enters the block section governed by signal No. 3, it opens normally closed spring b, in track instrument B, and puts signal No. 3 to danger, as already described for signal No. 1. It at the same time closes normally open spring b¹, which completes a circuit for a part of battery X, as follows: From battery X, wire 7, through magnets H, of interlocking instrument, mend wire 8, spring b¹, back to battery wire 6. This current, in magnetizing coil H, of interlocking instrument, closes normally open spring o, at the same time opening normally closed spring p, of interlocking instrument.

When a train passes a train length (about 2,000 ft.) beyond signal No. 3 it operates track instrument C, which closes normally open spring c, completing circuit from

spindle up. This is owing to the local circuit referred to above, which robs the signal of its battery by means of a shunt. When the train is passed entirely by the clearing track instrument, spring c again opens, magnet D is demagnetized, contact between d¹ and d is broken, the local circuit is interrupted, and all of battery X again passes through the magnets of signal No. 1, clearing it.

It will be seen that a train, upon entering the section governed by signal No. 1, opens normally closed track instrument spring a, thus breaking the circuit that holds the points of block relay E in contact. These relay points separate, leaving signal No. 1 at danger. When the train passes signal No. 3 it closes normally open track instrument spring b¹, completing a circuit through coils H of interlocking instrument, thereby closing its normally open spring o and opening its normally closed spring p. The signal circuit is now broken both at points of block relay E and at spring p of interlocking instrument; but by closing spring o, the first of the two operations necessary to close the circuit which energizes the coils of block relay E is completed. The second operation is performed when the train passes over track instrument C, closing its normally open spring c. Instantly the coils of both block relay E and shunt relay D are energized, and their contact points closed. Upon the closing of these contact points, the local circuit through the coils of the interlocking relay is established and springs o and p restored thereby to their normal position. The signal circuit is now completed, but signal No. 1 will not clear so long as a train is passing over track instrument C, keeping its spindle up, owing to the action of the local circuit already described.

The Hall signals on the Chicago & Northwestern cover about 86 miles. The main lines of this road running out from Chicago extend westward, northwestward and northward. The line to the west has Hall signals from West Fortieth street, Chicago, to Turner, 25 miles. The line to the northwest has them from Clybourn Junction to Barrington, 29 miles, and that to the north has them from Deering to Waukegan, 32 miles. Following is the substance of the circular of instructions issued by the Superintendent:

The signals indicate danger by displaying a red disc by day and a red light by night. The absence of the disc by day or a green light displayed by night, indicates safety. A small portion of the red disc will be visible when the signal is at safety, at the upper left-hand edge of the opening in the signal case, and serves to show that the disc is there, and connected with the signal instrument.

The signals are located on the left of the track they govern (the trains run on the left-hand track), and have odd numbers for the northbound or westbound track, and even numbers for the southbound or eastbound track.

Each signal is connected with every switch in that block; that is to say, in the track it governs between it and the next signal in advance, and will indicate danger as follows:

1. When a train has passed it, but has not passed a clearing instrument 1,500 feet or more beyond the next signal.

2. When a switch in that block is open.

3. When a switch has been opened and closed, but has not had its clearing key operated after the switch has been returned to its normal position.

Clearing keys are in boxes on posts adjoining the switches they are to be used with. The boxes can be opened with a standard switch key.

By pressing the clearing key and keeping it closed while counting five (5), all the operations are performed upon the signals with which it is connected that would be performed in succession by a train in going out of the block after having entered it.

A train finding a signal at danger shall come to a stop before reaching it, and shall wait three minutes (unless the signal shall clear in less time) before proceeding. If the signal shall go to clear and come to a state of rest in the clear position, the train may proceed at the usual rate of speed; but, if the signal shall not have cleared, the train, at the expiration of three minutes, may, after placing three torpedoes as per rule, proceed cautiously and under full control, expecting to find a train or an open switch in the block. No part of a train shall stand within two (2) rail lengths on either side of a signal.

Any train stopped by a danger signal, or leaving a part of the train in one block to do work in the next block, or making an unusual stop, must protect the train as though there were no block signals back of them.

The conductor of a train taking a siding to allow another train to pass, after his train has cleared the main track and the switch has been closed, shall clear the signals governing the track vacated, by pressing the clearing key of the switch by which he left the main track.

The conductor of a train crossing over from one main line to the other to allow a train to pass, after his train has cleared the cross-over and both cross-over switches closed, shall clear the signals of the track vacated by operating the clearing key of the cross-over switch in that track, and upon returning to his proper running track, after his train has cleared the cross-over, and both cross-over switches closed, shall clear the signals of the track temporarily occupied by operating the clearing key of the cross-over switch in that track.

Opening either switch of a cross-over sets to danger the signals governing both blocks in which the cross-over is located, neither of which can be cleared until both switches of the cross-over are in their normal position.

A train allowing another train to pass it shall not come out on the main track until the train which has passed shall have reached the next signal, or had ample time to do so; but shall open the switch leading to the main track in order to keep the signal back of the switch at danger for its own protection.

Section foremen and the foremen of other crews having occasion to open a switch must attend to the operation of the clearing key. The key must not be operated if there is a train between the switch and the signals next back or ahead of the switch.

Section men and others using hand cars must stop before passing over each track instrument, and move over it slowly to avoid operating the signals. With heavily loaded push or hand cars, an iron or wooden shim must

be used to prevent the wheels from striking the lever of the track instrument.

Conductors must report by wire all delays caused by signals. At the end of run, conductor and engineman shall fill out blank report cards to correspond with any stops they may have been obliged to make by reason of the signals, and send them to Division Superintendent.

To aid in giving the engineers and others a clear idea of the operation of the signals an experimental set was erected in a vacant building at Chicago, and all employees having to do with the signals were taken there and allowed ample time to examine the details of operation, a man being in attendance to explain any point not understood. A section of double track with a crossover was laid down, and full sized signals, switch stands, track instruments, etc., connected up as for regular service. The signal cases and the covers of the track instruments were removed so that the operation of the electrical instruments could be clearly seen.

Wilson's Block Signal Circuit.

The Hall Signal Co. prints in its new catalogue a description of the automatic signals erected some time since for the Kansas City, Fort Scott & Memphis road at Kansas City, and we reproduce the main part of it herewith. The peculiarity of the installation is the arrangement of circuits for automatic block signals, patented by Mr. A. J. Wilson, Superintendent

for the company, by which the signals stand normally at danger and only show clear for a short time before the approach of the train. By reference to the diagram, fig. 4, it will be seen that this arrangement is very simple. The signals are operated by a rail circuit, which actuates a relay in the usual way. When a section of track is clear this relay remains closed, but it does not close the electromagnet which holds the signal disc in the clear position, for the reason that the so-called local circuit, running through the coils of the signal magnet, is extended back on poles to the relay of the next preceding signal, where it is held open, except during the passage of a train over the section controlling that relay. This will be clearly seen by reference to the middle signal in the diagram shown. The points of the relay for this signal are closed, thus closing (at that point) the circuit which goes into the signal case, but the circuit is held open at the relay of the previous signal (shown at the right of the cut), and it will remain open until a train enters the right-hand section, opening this relay and thereby closing the circuit which clears the middle signal. Assuming, therefore, that the line of road is straight and the weather clear, the engineman can see the signal of the second block turn from danger to clear

line from their respective sidings, provided no train is in the block.

Signal 1, located just north of bridge No. 1, is cleared by an approaching train when it reaches a point within 1,000 ft. of the signal; at the same time bell No. 1 is rung, notifying the switchman at that point that a train is approaching from the north. The circuit of this signal runs through both ends of the cross-over track and the switches in its block, and cannot be cleared unless these switches are in normal position. A train on passing a point 60 ft. beyond this signal sets it to danger and clears signal 3.

Signal No. 5 is a signal governing trains desiring to leave the siding at stock yards and cross over to the north-bound track. This signal will show clear only when switches are properly set for train to cross over, provided no train is on the south-bound track between the A., T. & S. F. connection and signal No. 7, or on the north-bound track between signals 12 and 6.

Bell No. 2, located between switches 8 and 9, is set ringing when a train passes the A., T. & S. F. connection, informing the switchman at the stock yards' switch that a train is approaching from the north.

Signal No. 7 is located about 300 ft. north of the Kansas City Belt railroad crossing, and is connected with the derailing switch of that crossing. A train on passing a point 60 ft. beyond this signal sets it to danger and clears No. 9; at the same time it rings bells 3 and 4.

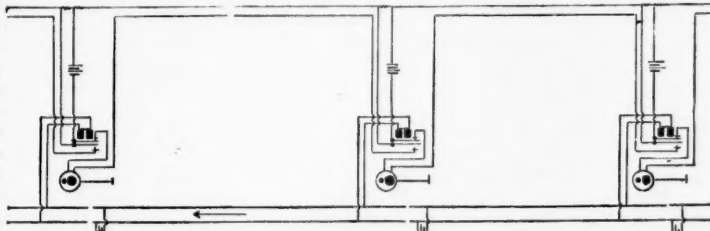


Fig. 4—Electrical Connection for Hall Automatic Block Signals on Kansas City & Fort Scott & Memphis Railroad.

The signal case marked 12 and 14 has two signals showing in opposite directions. No. 14 is to govern trains running south on the north bound track.

New York Railroad Commissioners' Report.

The Railroad Commissioners of the State of New York, Samuel A. Beardsley, Michael Rickard and Alfred C. Chapin, have sent to the legislature the tenth annual report of the Board. As usual the first chapter is on the general railroad situation of the country, and is devoted chiefly to the matters now before Congress. The legalizing of pools is recommended. The length of railroad in New York State, June 30, last, is reported as 7,656 miles, which is only five miles greater than the length reported the year previous.

Concerning changes in the law the report says:

The law of 1887, forbidding railroad directors to issue bonds except on consent of the majority of the stockholders, was repealed by the law of 1892. The law of 1892 also reverses the policy of the state by requiring the consent of the Railroad Commission to the building of a new railroad. The decisions of the Commission in this matter are reviewable by the courts. While this increases the responsibilities of the Commission another law weakens its power by abolishing the clause making the findings of the Board *prima facie* just and reasonable. This places the burden of proof upon the commissioners in enforcing their recommendations upon the railroads.

Grade crossings are discussed at length. The number of persons killed at such places during the past five years has been 238 and of injured 273. It is held that where a new highway is built across a railroad it should go over or under; the town should bear one-half the expense, and the courts should appoint a commission of three persons to determine the nature and cost of the bridge. Where an existing grade crossing is changed it is held that the Railroad Commissioners should determine the nature of the new crossing and apportion the expense, but no opinion is expressed as to the principles upon which this apportionment should be made. The legislature is urged to order a certain number of the more dangerous crossings changed each year.

The Commissioners hope that Congress will pass the law requiring M. C. B. couplers on freight cars, and they recommend that New York State require them on all cars after Nov. 1, 1893; the Commissioners, however, to have power to extend the time. Legislation is also recommended to require the equipment of a percentage of all freight cars with automatic brakes each year.

The danger from the five drawbridges between Albany and Spuyten Duyvil, on the New York Central, is held to be out of all proportion to the benefits accruing from their maintenance, and the Commissioners think that Congress ought to declare these small waterways no longer navigable, so that the drawbridges can be abandoned.

Concerning trespassers, the report says: "The number of persons killed and injured while trespassing upon the lines of the state is large. The statutes make such trespassing a misdemeanor, but these laws are not enforced. By common consent, magistrates discharge nearly all such offenders upon arraignment. Could the laws be made more rigorous, and the discretion of the magistrate be narrowed, the result would be a gain in the lessening of accidents."

On car lighting the report says:

"Success has attended the effort to light passenger cars by gas. Last year the Board set on foot inquiries as to the practicability and safety of the various systems in use, and the answers were assuring in both respects. Indeed, so practical and so successful are the systems, and so widely have they been adopted, that a car in one of the first-class or limited trains lighted by oil would be regarded as a relic of a past age. A sufficient reason why every passenger car, whether a palace car or an ordinary coach, should not be lighted by gas cannot be given. Economy should not be the prevailing considera-

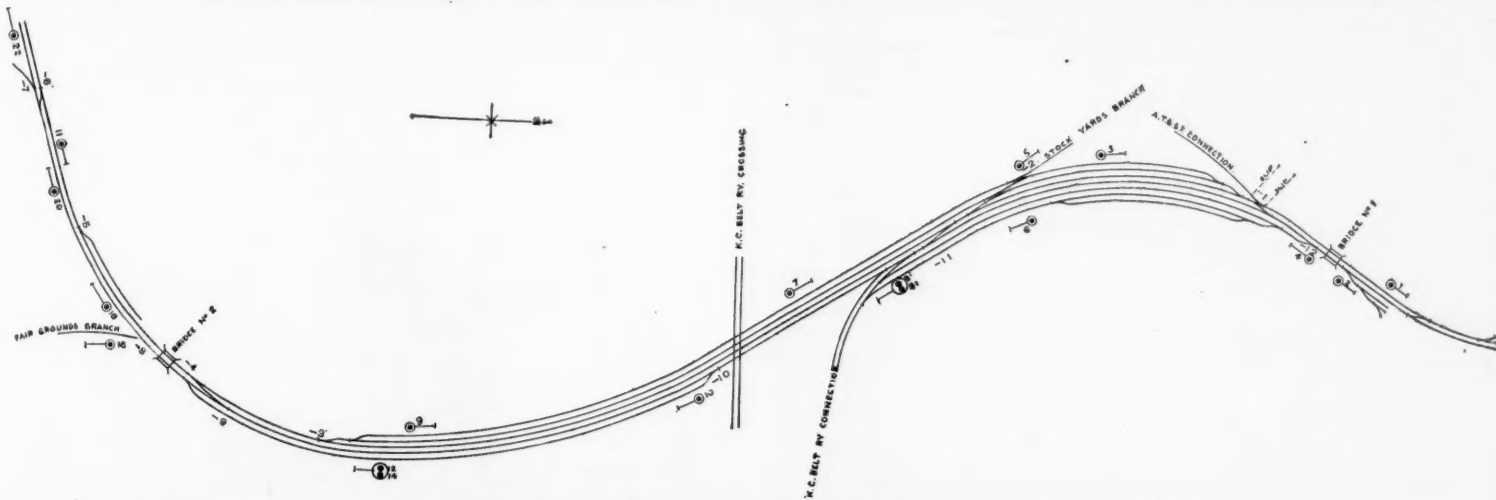


Fig. 5—Hall Automatic Signals in Kansas City Yard—Kansas City, Fort Scott & Memphis Railroad.

as he enters the first block. A diagram of the Kansas City yard is shown in fig. 5. The normal position of all signals is danger. All main line signals are cleared upon the entrance of a train into the block preceding the one which they protect, provided all the switches in the block they protect are in normal position and no train is in the block, or within fouling distance of the main line.

The movement of any switch in the block from the normal position will place the signal protecting that block at danger. All signals on the main line are blocked when the first wheel of the engine passes a point 60 ft. beyond the signal.

An explanation of a few of the movements in this yard will serve to indicate the principle on which the signals are arranged and enable the reader to easily follow any of the combinations shown. The figures preceded by the minus sign (—) indicate the location of bells.

Signals 2, 4, 5, 8¹ and 8² are cleared when the switches are properly set for a train to proceed on to the main

Chapter 289 of the laws of 1889 created a commission to revise the general laws, and among them the railroad laws. The work thus begun, however, did not stop at revision. Before the Legislature had finally enacted the bills prepared by the commission, many changes, some radical, were made. The laws enacted did not go into effect until May 1, 1891. During the year when the law was in abeyance defects were discovered in it. The commission prepared a bill to correct these defects, which was presented to the Legislature of 1891. It failed to pass owing to the "deadlock" in the Senate of that year, and the "Railroad Law" of 1890 went into effect on May 1, 1891, uncorrected. During the year following the railroad corporations of the State were much embarrassed in the operation of their franchises under the incongruities of the law. This was not without advantage, however, as during the passage of the act of 1890 the attitude of the corporations had been obstructive; after a year's experience of the new law their attitude changed and they united with others in revision. The result was a bill which, after many amendments, became chapter 676 of the Laws of 1892. Six months experience of the law demonstrates that the railroad corporations are content with it. The public has gained greatly by the enactment of safeguards which selfish interests had heretofore defeated.

tion. Aside from the increased security from fire, the annoyance of dripping oil from the lamps is avoided. The lighting of all passenger cars by gas is in line with the progress which has led to heating by steam instead of by stoves, and which is leading to automatic couplers instead of the link and pin, coupled by hand, and automatic brakes set from the engine rather than by men on the tops of cars at the risk of their lives. The prohibition of the use of oil by legislative enactment is desirable.

The behavior of passenger cars in collisions is next taken up, and it is stated that common passenger cars are too lightly built for safety, sleeping and drawing-room cars always being found to withstand shocks much more successfully. This is given as a result of the experience of the Board for 10 years, which must mean the experience of Commissioner Rickard, as the other Commissioners have only recently taken office.

Four persons have been killed and six injured by having a foot accidentally fastened in the narrow spaces between guard rails or in frogs. It has been claimed that blocking frogs introduces new elements of

danger, but the Commissioners do not admit this. They find the great majority of practical railroad men in favor of blocking.

The accident record is for only nine months (to June 30), the termination of the year having been changed.

The report shows:

	Killed.	Injured.
Passengers, not by their own fault	13	77
Passengers, by their own negligence, etc.	8	41
Employees	206	1,031
Other persons	253	283
Total	480	1,432

Of the "other persons" killed, 168 were walking on the track. The 13 passengers in the first item were killed in the rear collision at Hastings. "Beyond the subjects which have been discussed in this report, and upon which legislation has been recommended, the accident record does not suggest further legislation."

The report then goes on to refer to the extension of the block system on the New York Central, but says that "it is not wise to place too great reliance upon the system. . . . Indeed, in a comparison made between two roads, one operated under the open and the other under the block system, the distance and time being the same, with more trains run on the open than on the blocked road, it was found that there were more rear collisions in the same space of time on the road under the block than on that using the open system. If the adoption of the block system in this state is to result in any lessening of care upon the part of the employees the public may have reason to regret the substitution of mechanical for human agency."

It would be interesting to know where and when this comparison was made, as it contradicts all previous experience. Anything showing that engineers can guess where a preceding train is, more successfully than a block signal operator can tell him from positive knowledge, should be published to the world in detail.

The physical condition of the roads of the state continues to improve. In this connection reference is made to the Empire State express, which has now been running a year and earning an average of \$2.60 a mile. It has reached destination behind time only once a month, on the average. It is stated that cars and engines having been perfected for high speed and heavy rails and superstructure provided, the weakest point now is the masonry, "hence the work of strengthening the substructure along the whole line has been begun." Ten months' use of 100-lb. rails is so satisfactory as to justify the extension of this size to the passenger tracks of the main line of the New York Central.

Motter's Locomotive Hand Car.

The accompanying illustrations represent a self-propelling hand car which is intended for the use of superintendents, roadmasters and others having occasion to inspect track, bridges, etc.

The power used is gas, or rather a gaseous mixture of the vapor of gasoline and atmospheric air, made by pumping a small quantity of gasoline into the cylinder every second revolution. When compressed by the upward stroke of the piston, the gas is ignited inside the cylinder by an electric spark. One advantage claimed is that the engine can be got under way two minutes after being placed on the track.

The liquid gasoline is pumped into the cylinder by a small pump having a plunger $\frac{1}{8}$ in. diam., and the air is simultaneously sucked into the cylinder. The return stroke of the piston compresses the charge of mingled air and gasoline, and on the outward stroke of the next revolution the charge is exploded by the electric spark. The exhaust is expelled on the return stroke. Thus the propelling power of the explosion is felt only on one stroke in every two revolutions. So far, of course, this is in conformity with the usual cycle of operations in all gas engines. The principal novel feature is a friction clutch in combination with a universal joint and reversing gear.

The engine works on an inclined shaft running lengthwise of the car, and the power is transmitted by a bevel pinion to a pair of bevel wheels on the axle. By shifting the shaft, the pinion engages with either bevel wheel, according as the car is required to run forward or backward.

In starting, a gas engine should run a few revolutions without a load, so that the charge may be compressed

before explosion. In order to effect this, a friction clutch is used, by which the engine can run without transmitting any power to the axle. This clutch is operated by a hand lever, and provided with adjustments to take up wear, and is novel as the combination of a friction clutch as part of a universal joint.

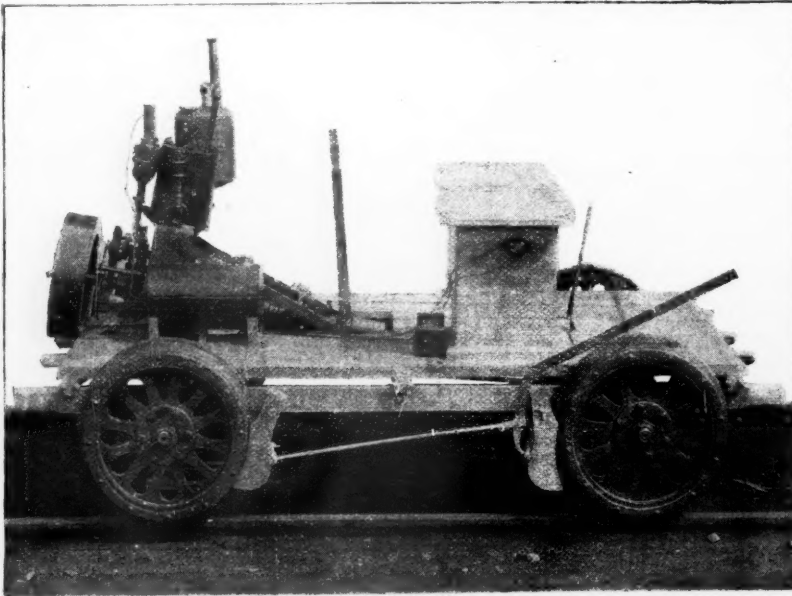
The electric battery from which the spark is obtained is placed underneath the seat, and with the wires is clearly shown in our illustration.

The average speed attained with six persons is about 12 miles per hour, but 17 miles per hour has been attained when carrying two persons. Sufficient gasoline can be carried to run 100 miles. The weight of the car is 575 lbs. One of these engines is in use on the Atlanta & West Point, where it is stated to give good service. It has been tried on many Southern roads and has given good satisfaction. The manufacturers are the Motter Hand-Locomotive Co., of Springfield, O., of whom any further information may be obtained.

A Few Notes on European Railroads.

BY J. P. PATTINSON.

The following are a few notes made on a recent trip from London, through Belgium, Germany, Switzerland,



The Motter Locomotive Hand Car.

the Tyrol and North Italy, undertaken with a view to acquire some information on the railroads of those countries.

From London to Dover the London, Chatham & Dover route was used. The following are a few details of the running of that company's Continental express:

Distance, miles.	Stations.	Time dep. a.m.	Time actual a.m.	Speed, miles per hour.
1	Victoria.....	dep. 10. 0.0	10. 1.55	
	Herne Hill.....	arr. 10. 8.38		36
	do.....	dep. 10.12.0	10.14. 9	
22 3/4	Sole Street.....	pass. 10.19.25		39
30 1/4	Chatham.....	arr. 10.58.20		50
	do.....	dep. 10.53.0	11. 1.57	
17 3/4	Faversham.....	arr. 11.11.9	11.27.26	42
	do.....	dep. 11.17.0	11.32. 5	
19 3/4	Shepherd's Well.....	pass. 11.59.41		43
5 1/4	Dover.....	arr. 11.55.0	12. 5.41	55

The gradients are seldom easier than 1 in 200 and generally varying from 1 in 100 to 1 in 132. The engine used was of the four-coupled type, with 6 1/2-ft. drivers, cylinders 18 x 26 and 1,120 sq. ft. of heating surface. The load, exclusive of engine, was about 185 tons from Herne Hill to Faversham and 110 tons after.

The sea passage from Dover to Ostend was made by the excellent steamer of the Belgian State Railroads in 3 hours 20 minutes. At Ostend a train of seven carriages and a Pullman car was waiting to convey us to Brussels.

It was noticed that, although most of these carriages weighed 14 or 15 tons each, few of them contained more than four compartments (English style), affording accommodation for only 25 or 30 passengers. This seems like carrying a lot of dead weight for very little paying weight. Most of the compartments were fitted with lavatory accommodation and were comfortable.

The train was hauled to Brussels by an enormous four coupled engine with both leading and trailing wheels. The engine greatly resembled the type exhibited by the Belgian State railroads in the Paris Exhibition of 1889.

Its performance from Ostend to Brussels was as under:

Distance, miles.	Stations.	Time dep. p. m.	Time actual p. m.	Speed, miles per hour.
14 1/4	Ostend.....	dep. 4.9.0	4.17.00	
	Bruges.....	arr. 4.38.36		40
	do.....	dep. 4.32.0	4.39.47	
27 3/4	Ghent.....	arr. 5.12.20		51
	do.....	dep. 5.5.0	5.13.44	
33 3/4	Brussels.....	arr. 6.3.0	6.04.30	40

This running, although good with a train weighing about 135 tons, exclusive of engine, is yet better than it seems, as the train lost fully a minute on each side of Ghent, and once or twice other slight checks arrested progress.

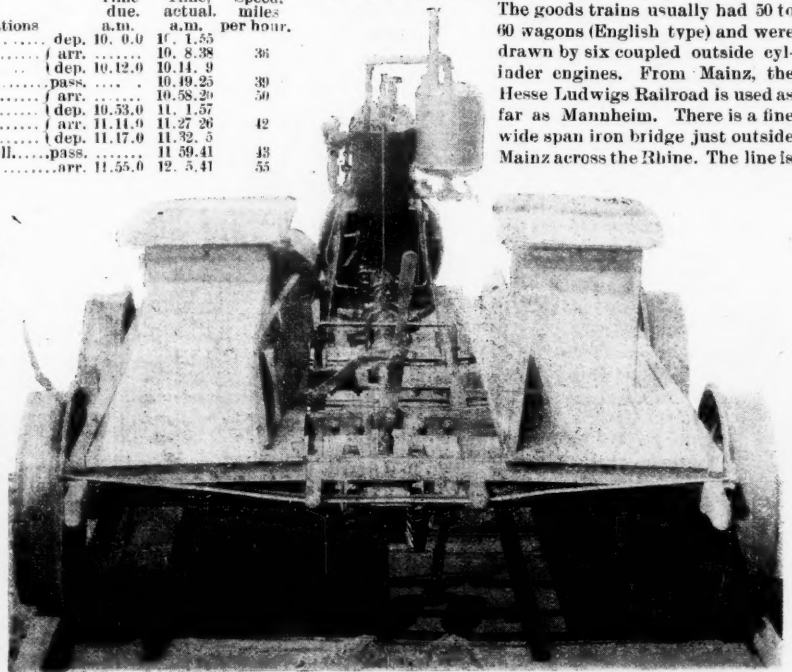
So far as could be judged, the permanent way of the Belgian State Railroad is in excellent condition, and might compare with that of any English road. The ballast is generally of rock or gravel and flush with the top of the metal sleepers which seem to be extensively used, although from what we have recently heard they do not seem to give every satisfaction to the Belgian authorities. The rails are of the Vignoles pattern and on some sections they weigh as much as 100 lbs. to the yard. The signaling is much after the usual English system. Semaphores seem to be extensively used, and there is a great absence of the disc signals so common on Continental railroads. Each kilometre is marked by a board facing each way down the line and mounted on a tall iron post, and the gradient markers not only state the inclination, but give its length also. Another noticeable point is the excellent station accommodation given at roadside stations. At the more important points, such as Ostend, Ville, Bruges, etc., really splendid edifices have been erected.

The morning express from Brussels to Cologne was taken. There was nothing extraordinary to chronicle in the speed of the train, which weighed about 160 tons, exclusive of the four-coupled engine which hauled it. Forty miles an hour was rarely exceeded. After Ans station a kind of brake wagon is put on in front of the train, the line descending from that point into Liège on a gradient of 1 in 30. In the opposite direction pusher engines are used. Some severe gradients are also met with after Verviers in crossing the Ardennes, and a six-coupled engine was used from that point on our train.

At the frontier station, Herbesthal, the Cologne Administration (Left Rhine) took charge of the train with a four-coupled 46 ft. drivers' outside cylinder engine. The line is apparently in excellent condition, and nearly all the stations along it are tasteful structures and afford ample accommodation. Semaphores are greatly used for signals, and are on iron posts, painted in bands of red and white about a yard wide. The semaphore arm is generally white, with a broad red border.

From Cologne to Mainz the Rhine boat was used. Both the right and left Rhine railroads follow the course of the river, and, at many points, tunnel under projecting rocks. Two fine railroad viaducts cross the river above Coblenz. Two or three express trains were seen from the boat, and it was noticed that two engines were almost invariably used, the loads being generally over 175 tons.

The goods trains usually had 50 to 60 wagons (English type) and were drawn by six coupled outside cylinder engines. From Mainz, the Hesse Ludwigs Railroad is used as far as Mannheim. There is a fine wide span iron bridge just outside Mainz across the Rhine. The line is



The Motter Locomotive Hand Car.

ballasted with earth and gravel. At Mannheim, the train is handed over to the Baden State Railroad. This railroad, which seems to make faster time than most others of Western Germany ran its principal day express as under from Karlsruhe to Offenbourg:

Distance, miles.	Stations.	Time dep. p. m.	Time actual p. m.	Sp'd m's per h'r.
15	Karlsruhe.....	dep. 3:42:00		46
	Rastatt.....	pass. 4:01:30		41
5 1/4	Oos.....	arr. 4:09:50		41
	do.....	dep. 4:17:00		36
3 3/4	Steinbach.....	pass. 4:23:15		37
12 1/4	Reichen.....	pass. 4:36:30		40
5	Appenweiler.....	pass. 4:41:00		30*
	Offenbourg.....	arr. 4:51:00		

*Slowly through Appenweiler.

Parts of the above are not bad. It should be mentioned that both Mannheim and Karlsruhe are back-out stations.

After Offenbourg the Black Forest Railroad diverges to the left. The mountainous part of this magnificent stretch of line really commences at Hornberg, from which point to the summit, near Sommerau, the gradient varies from 1 in 50 to 1 in 56. From Hornberg, two engines were used on a train of about 130 tons. The speed was uniformly 25 miles an hour up the incline. The structure of the railway is interesting throughout, the permanent way being ballasted with granite and excellently maintained.

At Schaffhausen we were transferred to the Swiss Northeastern Railroad. Excellent carriage accommodation exists on this line, combining in many respects American and English practice. Carriages of all classes are entered from the end only, and there is a central passage between the seats. The third class are generally open throughout, and although entirely uncushioned, are yet cheerful vehicles, with plenty of glass in the windows. The seconds are upholstered in blue cloth, and the whole carriage is generally divided into two or three large compartments by a partition and a door. The firsts are nearly always compartments in themselves, and are upholstered in red or green velvet cloth. These descriptions will hold good to a great extent for nearly all the Swiss lines, which appear to build their stock more or less to the same model, with slight variations on each line in the upholstering for the various classes. The use of the Westinghouse brake and the practice of heating by steam seem general. Most of the companies make use of oil as an illuminant, but the Gotthard company has gas, and the Jura-Simplon electric light. It was noticed on the way to Zurich that metal sleepers were a good deal employed, and the line appears to be very well taken care of. Telegraph posts were in many cases of iron, and so were the gradient indicators, the arms of which were curved back from the line so that the grade might be seen from the oncoming train.

At Buchs the train is handed over to the Austrian State Railroads, and, after traveling along the valley of the Rhine as far as Feldkirch, the ascent of the Arlberg commences. The engineering works on this line have so frequently been described that I will not recapitulate them here. The line is single throughout, and is noteworthy as being (in parts) the steepest of any of the lines crossing the Alps. The gradients are briefly as follows:

Stations.	Grade.	Length of grade, Kilometres.
Bludenz.....	Rising.	
Bratz.....	30 in 1,000	6.85
Hintergasse.....	"	4.25
Dalaas.....	"	4.
Dannhöfen.....	29 in 1,000	5.11
Langen.....	"	3.38
St. Anton.....	15 in 1,000	6.25
	2 in 1,000	4.25
Pettneu.....	Falling.	
Flirsch.....	24 in 1,000	6.14
Strengen.....	24 1/2 in 1,000	6.21
Plans.....	25 in 1,000	4.18
Landeck.....	"	5.08
	"	6.28

On the heaviest part of the grade, between Bludenz and Dalaas, some special observations were made on the speed of the train, which consisted of nine carriages (about 13 1/2 tons each), one sleeping and one dining car making up a heavy total of about 175 tons. This was hauled by two large six-coupled engines. The speed up the 1 in 33 under these conditions varied little and averaged about 125 seconds the kilometre (200 seconds a mile), or about 18 miles an hour. The speed down the grades after passing the summit at the Arlberg tunnel, was of course greatly limited by the rapid descent and sharp curves.

A zone system of fares has lately been tried on this railroad, but apparently without the success that was expected. Receipts as a result have been either stationary or declining and expenses have risen appreciably. From a casual examination of zone fare tables at a few stations on the Arlberg the fares seem to be about .35 of a penny a mile, for third class.

From Zurich the express was taken to Lucerne. By "express trains" the Swiss mean a train with an inclusive speed of 30 miles an hour or a little under. These low speeds are, of course, rendered necessary by the great proportion of single track by steep gradients and curves of small radius.

On return to Lucerne from the Righi, the writer decided to make a trip over the Gotthard Railway. This system which, in so short a length, probably comprises more engineering works of high order than can anywhere else be found in the world, has recently found its traffic too extensive for a single line, and is now engaged in doubling the main line throughout. This doubling is being performed in very fine style indeed, and the massive character of the works, altogether apart from their bold and daring conception, must excite admiration. The great St. Gotthard tunnel, the lofty viaducts, and the smaller spiral tunnels have been so frequently described that I will not recapitulate these particulars here. The permanent way is in very fine condition indeed. The ballast is rock and most of the sleepers are steel. Among other points it was noticed that granite is very largely used on this system for various purposes; the kilometre posts, grade indicators and, in many places for miles together, the fencing of the line being in gray

granite. Semaphore signals are almost exclusively used.

At Lugano, boat was taken across the lake to Corlezza and from this point the narrow gauge line was used to Menaggio on Lake Como. This line is one of a number which ramify over North Italy. Two carriages form the train which is drawn by a small six-coupled locomotive. The curves are very sharp, a few having a radius of only 50 metres. A long descent at 1 in 21 occurs before reaching the terminus at Menaggio. A similar line is that from Ponte Tresa, at the west end of the Lake of Lugano, to Luino on Lake Maggiore. Here the gradients are not so steep and consequently the trains consist of three and sometimes four carriages. The curves are, however, very sharp. The line follows the windings of the Tresa and is almost continually on curves of 50 metres radius. Both lines are excellently maintained. The installations, (stations, etc.), are, of course, on a cheap scale and it is really matter for surprise that other countries have not built these light railroads to anything like the extent to which they exist in Italy.

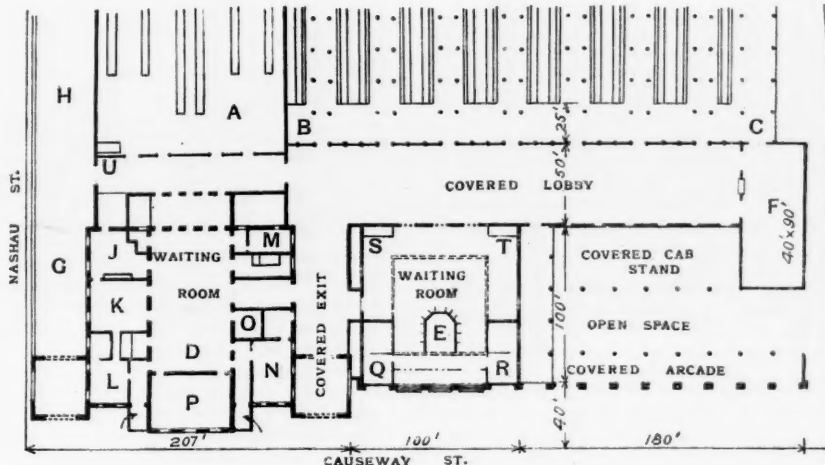
The Swiss Central, which was used from Lucerne to Basel, possesses most of the characteristics of the other Swiss lines. The company's extensive locomotive shops are at Olten and here one of Maffei's compounds with cylinders .355 metres x .540 x .630 and with four axles was noticed. This engine weighs 59 tons and is similar to, but smaller than, an engine on the St. Gotthard, built by the same locomotive engineer. A great proportion of the engines in the shops seemed to be tank engines, and this seems to be the case generally speaking on most of the Swiss lines. A very heavy grade of 1 in 40 for nearly five miles ascends from Olten to Laufelfingen. With two tank engines (one four-coupled and the other six coupled) and a heavy load of about 200 tons the morning express ascended this grade at a steady rate of about 19 miles an hour.

also sometimes brought right up to the top of the rails, and sometimes kept quite flush with the cross sleepers, and is sand, gravel, stone, etc., by turns, but nothing long. The stations along the line of route are in general good, and are better north of Strasburg than south of it. Semaphore signals are largely used. The grade indicators give the inclination and distance, and have also an arm projecting from the back of the upright at right angles to the line, so that the particulars of the grade and its length may be read from the train approaching in either direction. The rolling stock on the system seems well maintained. The first-class carriages are upholstered in red velvet, and the second generally in plush of various colors. Both frequently have lavatory conveniences, and are warmed by steam from the engine. The lighting is rather poor. All carriages are constructed, of course, on the compartment system as opposed to the through passage arrangements prevailing in Switzerland. Third-class carriages are poor throughout.

At Luxembourg the train for Brussels is handed over to the Belgian State Railroads. Steep gradients occur all the way from Arlon to Brussels, the ruling grade being 1 in 62 1/2 over the Ardennes. Particulars of the performance of the express, which weighed about 120 tons (exclusive of a huge six-coupled engine) are as under:

Distance, Kils.	Stations.	Time Due, p. m.	Time Actual, p. m.	Remarks.
	Arlon.....	dep. 4:31:0	4:43:0	Nearly stopped at Libramont.
78	Jenelle.....	arr. 5:52:0	6:01:50	Slacked three times.
58	Namur.....	dep. 6:51:0	7:03:50	Slacked three times.
35	St. Leopold.....	dep. 6:57:0	7:07:50	Three signal checks.
7	Brussels (Nord).....	arr. 8:05:0	8:14:50	

A few observations were taken, apart from the above, on a rising grade of 1 in 62 1/2. The speed here was at the



New Boston & Maine Passenger Station at Boston.

A, present trainshed of Boston & Lowell division; B, C, new terminal tracks and platforms; D, main waiting room of existing station; E, ticket office; F, baggage room; G, baggage; H, express; J, kitchen; K, restaurant; L, women; M, baggage; N, men; O, barber; P, women; Q, women; R, men; S, telegraph; T, news stand.

At Basle the Alsace-Lorraine administration took charge of the express. To show what the State considers good enough for the best day train between Switzerland, Italy, etc., and Brussels we give below the due and actual times of the train in question from Basle to Luxembourg:

Distance, Kils.	Stations.	Due Time, a. m.	Actual Time, a. m.
	Basle.....	dep. 9:50:0	9:50:41
32	Mulhausen.....	arr. 10:21:0	10:20:26
	.....	dep. 10:24:0	10:25:50
6	Lutterbach.....	arr. 10:39:0	10:33:30
	.....	dep. 10:39:0	10:35:30
12	Bollweiler.....	arr. 10:45:0	10:48:0
	.....	dep. 10:45:0	10:49:15
25	Kolmar.....	arr. 11:12:0	11:11:45
	.....	dep. 11:12:0	11:15:15
13	Rappoltsweiler.....	arr. 11:26:0	11:28:30
	.....	dep. 11:26:0	11:29:31
9	Schlettstadt.....	arr. 11:37:0	11:39:30
	.....	dep. 11:37:0	11:41:45
	Strassburg.....	arr. 12:18:0	12:19:0
	.....	dep. 12:24:0	12:28:30
10	Vendenheim.....	arr. 12:37:0	12:40:0
	.....	dep. 12:38:0	12:45:30
34	Tabern.....	arr. 1:12:0	1:13:0
	.....	dep. 1:12:0	1:17:0
27	Saasbruck.....	arr. 1:45:0	1:51:30
	.....	dep. 1:45:0	2:05:00
12	Berthelmingen.....	arr. 1:58:0	2:07:15
	.....	dep. 1:58:0	2:33:45
24	Bensdorf.....	arr. 2:24:0	2:36:0
	.....	dep. 2:24:0	2:48:15
7	Nürchingen.....	arr. 2:39:0	2:49:30
	.....	dep. 2:39:0	3:12:0
43	Metz.....	arr. 3:22:0	3:37:0
	.....	dep. 3:22:0	4:11:0
31	Diedenhofen.....	arr. 3:57:0	4:13:15
	.....	dep. 3:57:0	4:46:15
33	Luxembourg.....	arr. 4:30:0	4:46:15

It will be seen that not only is the booked timing poor, but the actual running is poorer still. The gradients, except here and there, are favorable. At one or two points the line is single for short distances. The load was also a heavy one—quite 200 tons, exclusive of engines, of which we had two.

Traveling along the Alsace-Lorraine railroads one cannot fail to notice the different systems of permanent way in use. We have here both wooden and metal sleepers and metal longitudinal sleepers. The ballast is

rate of about 27 1/2 miles an hour, the train taking about 82 seconds for each kilometre, or about 130 seconds per mile.

Particulars of the running of the 9:10 a. m. express from Brussels to Ostend were taken next morning. This train is one of the fastest in Belgium, being allowed 102 minutes for the 76 miles. Had it not been for a bad signal check and stop just outside Ostend we should have improved on this time by about four minutes, in spite of having to materially decrease speed through Laeken, Alost, Ghent and Bruges. As it was we covered 47 kilometers (29 1/2 miles), after passing Ghent, in just under 34 minutes, which, considering that the road scarcely favors the train and that the load was 150 tons, is pretty good.

New Boston & Maine Passenger Station at Boston.

The announcement that the Boston & Maine would build a new passenger station at Boston, which was reported in the *Railroad Gazette* of Nov. 11, has been supplemented by a revised plan, giving more definite particulars. The plan is, in brief, to abolish the old Haymarket Square passenger station, the occupancy of which necessitates the use of a dangerous and troublesome grade crossing, to abolish also the Eastern Division station and several freight houses, and concentrate all the passenger business at the present Boston & Lowell Division station, which is to be enlarged. The plan as now published seems to make very good provision for the existing traffic, but the modest style in which the structures are to be built indicates that the company still has in view the execution of the more elaborate plans for a larger station. The present plan, as it is, has two defects. It makes no provision for the Fitchburg road, whose trains will continue to cross the Boston & Maine road to reach their own station on the east side of this, and there is insufficient room for an adequate train shed. The plan of the State Railroad Commissioners contemplates a station farther west, to the left of Nashua street, where there would be ample room. But

Stop for Runaway Cars.

The illustration shows a stop for runaway cars designed and patented by Mr. Morse, Superintendent Ferry Service, Southern Pacific Company, Atlantic System. It is not necessary to describe the device, for it is completely shown in the engraving. This has been in use for two or three years on the Southern Pacific, and has been found very efficient. On several occasions it has stopped strings of four, five and six freight cars moving at eight or ten miles an hour in a distance of 25 to 35 ft. without causing any damage.

Rules for the Supply of Electricity, Steam, Compressed Air and Power from Shafting at the World's Fair.

The following rules have been adopted subject to further modification by the Council of Administration. With slight exceptions the rules are the same as those approved by the commission in October. Power will be provided only from May 1 to Oct. 30, 1893, unless it is otherwise provided by special agreement. The Exposition management will not be responsible for stoppages from any reasonable cause, and all power service furnished to exhibitors will be at such exhibitor's risk. Power will be supplied gratuitously only for the purpose of exhibiting machinery in operation without a load, and no machinery will be allowed to run longer than is necessary for that purpose, except by permission of the Chief of the Department:

Electricity for Incandescent Lighting Service.—All power service for generating light will be furnished during the Exposition hours by the World's Columbian

Electricity for Miscellaneous Purposes.—Electricity for special purposes will be subject to special agreement, to be determined at the time of making application therefor. Rates will be based either on those of power or those for storage battery purposes, according to the class of work to be performed.

Steam for all Purposes.—Piping and all connections from main lines shall be supplied, erected and covered with non-conducting material by the consumer, subject to the approval of the Director-General and the Director of Works. Plans for the arrangement of piping shall be submitted by the consumer to the Director-General for approval before the agreement is signed. A rate of \$40 per horse power will be charged for steam supply between the hours of the opening of the Exposition in the morning and 6 p. m., from May 1 to Oct. 30, 1893, except when it is otherwise ordered in case of special evening entertainments; but in case the exhibitor so elects, he shall be charged \$60 per horse power for steam to be furnished during all the hours the Exposition is open from May 1 to Oct. 30, 1893. The maximum rate of delivery to consumers' pipes shall form the basis of payment, irrespective of the class of work performed. The working pressure to be carried by boilers will be 125 lbs. per square inch.

Compressed Air for All Purposes.—Piping and all connections from the main lines shall be supplied and erected by the consumer, subject to the approval of the Director-General and the Director of Works. Plans for the arrangement of piping shall be submitted by the consumer to the Director-General for his approval. Charges will be based on the equivalent in mechanical horse power for the maximum rate of supply delivered to the consumer's pipe at a rate of \$60 per H. P. Approximate pressure to be maintained in the mains will be 80 lbs. per square inch.

Power from Shafting.—The consumer shall supply and erect the pulley on the main line, together with all belts and connections to operate his machinery, and all pulleys for the main shafts must be balanced, in halves, and not more than 3 ft. in diameter, and secured so as not to weaken or injure the shafting. The form and

Railroad Building in 1892.

The railroad mileage built in the United States in 1892 was 4,090 miles in 38 states and five territories. The new track built in Canada was 264 miles and in Mexico 310 miles. The companies building this road and the lines on which the track was laid are reported in detail in other columns. The following table gives a recapitulation of the mileage by states:

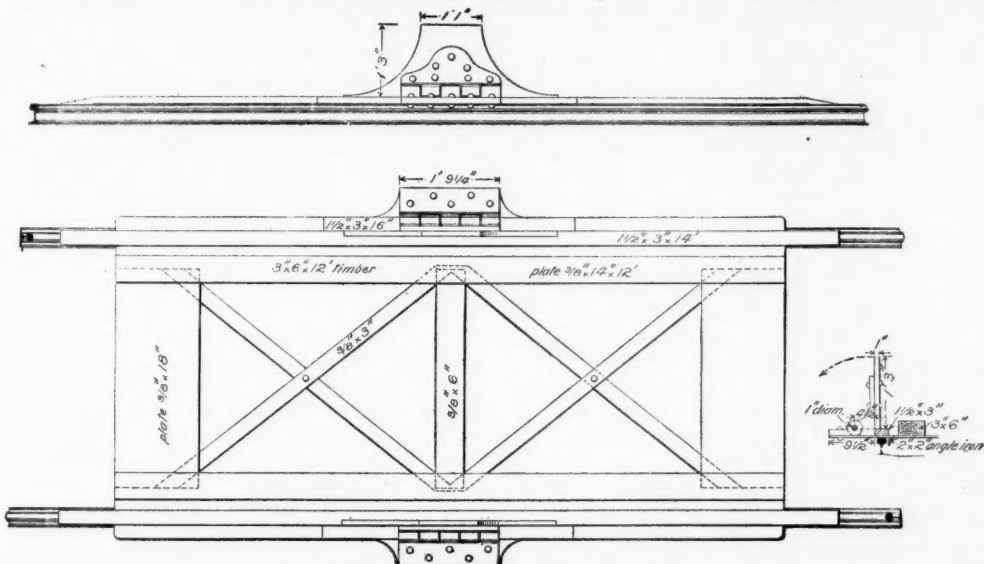
Alabama.....	24.	North Dakota.....	92.
Arizona.....	19.	Ohio.....	204.
Arkansas.....	49.5	Oklahoma.....	11.
California.....	89.8	Oregon.....	13.5
Colorado.....	20.4	Pennsylvania.....	307.
Florida.....	131.1	South Carolina.....	36.2
Georgia.....	61.8	South Dakota.....	5.5
Idaho.....	82.7	Tennessee.....	74.8
Illinois.....	81.	Texas.....	220.1
Indiana.....	155.9	Utah.....	28.7
Indian Territory.....	102.2	Virginia.....	27.
Iowa.....	54.5	Washington.....	432.4
Kansas.....	1.	West Virginia.....	191.3
Kentucky.....	40.5	Wisconsin.....	105.3
Louisiana.....	77.8	Wyoming.....	101.5
Maine.....	15.		
Maryland.....	20.5	Total, United States.....	4,064.5
Massachusetts.....	23.	Northwest Territories.....	89.5
Michigan.....	200.9	Manitoba.....	67.8
Minnesota.....	189.7	New Brunswick.....	12.
Missouri.....	199.	Ontario.....	25.
Montana.....	127.3	Quebec.....	69.5
Nebraska.....	76.5	Mexico.....	303.8
New Hampshire.....	28.7		
New Jersey.....	33.5	Total, Foreign.....	573.6
New Mexico.....	5.8		
New York.....	264.8	Grand total.....	4,638.1
North Carolina.....	44.3		

The group of Northern States east of the Mississippi River built 1,413 miles, or 34.4 per cent. of the new track; the Southern States east of the Mississippi River built 609 miles, or 16.3 per cent.; the Northwestern States built 729 miles, or 17.8 per cent.; the Southwestern States built 752 miles, or 18.3 per cent., and the Pacific States built 335 miles, or 12.9 per cent., the total new mileage.

NORTHERN STATES, EAST OF THE MISSISSIPPI.

Maine.	
Portland & Rumford Falls.—Gilbertville west to Rumford Falls.....	5.
Track laid.....	15.
New Hampshire.	
Brookline & Pepperell.—State line north of Pepperell, Mass. to Brookline.....	6.
Concord & Montreal.—On Whitefield & Jefferson Branch, end of track at Bowman's east to Berlin, 14.8 miles; on New Boston Branch, Parkers Station to near New Boston, 4.9 miles; and Jefferson Station to Jefferson Hill, 3 miles; total.....	22.7
Track laid.....	28.7
Massachusetts.	
Brookline & Pepperell.—End of track laid in 1891, near Pepperell, north to state line near Brookline, N. H.....	8.
Old Colony, on Plymouth & Middleboro.—Plymouth across Plymouth County to Middleboro.....	15.
Track laid.....	23.
New York.	
Adirondack & St. Lawrence.—End of track north of Poland to near Malone, 142 miles, on main line; Lake Clear Junction to Saranac Lake, 6 miles, and Prospect to Hinckley, 4 miles.....	152.
Cooperstown & Charlotte Valley.—West Davenport to near Davenport Centre.....	2.
Dutchess County.—End of track to Hopewell Junction, on New York & New England.....	1.
Kings County Elevated.—Schenck avenue to Logan street, Brooklyn.....	6.
Lake Champlain & Moriah.—Minerville to Fisher Hill.....	2.
Lake Shore & Michigan Southern.—On Silver Creek & Dunkirk, cut off of old line from Dunkirk to Silver Creek.....	8.7
Lehigh Valley, on Geneva & Van Ettenville.—End of track laid in 1891 near Hartwood, north to near Geneva, 50 miles; and on Rochester & Honey Valley branch, West Shore Junction to near Rochester 5.5 miles; total.....	55.5
Little Falls & Dolgeville.—Little Falls to Dolgeville.....	11.
Middlesex Valley.—Stanley to Naples.....	22.
Niagara Junction.—Erie Street, Niagara Falls to Schlosson Dock.....	2.
Rome, Watertown & Ogdensburg.—On Gouverneur & Oswegatchie, from Gouverneur toward Edwards.....	3.
Unadilla Valley.—Bridgewater to Leonardsville.....	5.
Track laid.....	264.8
New Jersey.	
Central of New Jersey, on Navesink Branch.—Atlantic Highlands east to Highland Beach.....	4.
Lehigh Valley, On Jersey City, Newark & Western to Newark Bay Shore.....	4.5
Philadelphia & Reading.—On Port Reading road.—End of track near Bound Brook, east to Port Reading, north Perth Amboy.....	17.
Rockaway Valley.—From Mendham, east to Morristown.....	8.
Track laid.....	33.5
Pennsylvania.	
Altoona, Clearfield & Northern.—Wopsononock to Dougherty.....	5.
Baltimore & Ohio.—On State Line R. R.—Brownfield south to Smithfield.....	7.2
Beech Creek.—Keermoor west to Mehaffey.....	12.
Bellefonte Central.—Strubel to State College.....	1.
Brownstone & Middletown.—Brownstone to Waltonville.....	2.5
Buffalo, Rochester & Pittsburgh, on Johnstown & Bradford.—From Mount Jewett, south to Howard Junction.....	20.
Buffalo & Susquehanna.—From Halls east through Potter County.....	3.
Clarion River.—Carmon to Croyle.....	1.
Delaware, Susquehanna & Schuylkill.—On Freeland Extension.....	1.
Eaglesmere.—Sonestown north to Eaglesmere.....	8.
Emporium & Rich Valley.—Branches near Elk Run and Sandy Station.....	4.
Erie & Wyoming Valley.—No. 7 Junction to Pittston.....	1.
Hunter's Run and Slate Belt.—Pine Grove Furnace to Slate Belt.....	5.5
Huntingdon & Broad Top.—On branch up Six Mile Run to coal mines.....	1.3
Keystone.—Near Gardener.....	4.
Kishaquillas Valley.—Reedsville to Alexandria.....	6.
Mount Jewett, Kinzua & Rittville.—On branches.....	2.
Mount Jewett & Smethport.—From Junction near Mt. Jewett to Hazlehurst.....	6.
Newport & Sherman's Valley.—Blain, southwest to New Germantown.....	4.
Oregon & Texas.—Caminal to Summit.....	6.5
Pennsylvania.—On Cambria & Clearfield lines and various branches, about.....	120.

(Continued on page 33.)



Stop for Runaway Cars—Southern Pacific.

Exposition from the 1st of May to the 30th of October, 1893, at the rate of \$8 per 16 candle power lamp capacity, or the equivalent in lamps of other candle-power. All changes in the location of lamps or appliances when once installed will be made subject to an extra charge to be fixed and determined by the Director-General and the Director of Works. The incandescent lighting circuit will be operated from 100 to 110 volt alternating circuits.

Electricity for Power Service.—The electric motor shall be suitable to operate on a 500-volt constant potential circuit. The rheostat shall be constructed wholly of non-combustible material. The main line switch shall be of the knife-blade type, and suitable for working a 500-volt constant potential circuit. The motor shall be erected in position by and at the expense of the consumer, and in a manner subject to the approval of the Director-General and the Director of Works. The service connections to the motor shall be installed, maintained and owned by the World's Columbian Exposition. No service shall be rendered for less than \$20. Fractions of horse power will not be considered except for motors of less than 1 H. P. Charges will be made for service of connecting the main line at the following rates: For 1/2 H. P. and less, \$10 per H. P.; for 1 to 5 H. P., \$15 per H. P.; for more than 5 H. P. and not exceeding 10 H. P., \$12 per H. P.; for more than 10 H. P., \$10 per H. P. Charges for service will be based upon the maximum mechanical horse power delivered to the motor, at the following rates: For 1/2 H. P. and less, \$20 per H. P.; for more than 1/2 H. P. and not exceeding 1 H. P., \$40 per H. P.; for more than 1 H. P. and not exceeding 1 H. P., \$75 per H. P.; for more than 1 H. P. and not exceeding 2 H. P., \$70 per H. P.; for more than 2 H. P. and not exceeding 3 H. P., \$60 per H. P.; for more than 3 H. P., \$60 per H. P. Special service for motors not exceeding 2 H. P. can be furnished on 1/4 alternating current incandescent circuit.

Electricity for Arc Lighting.—The aisles of the main building will be illuminated by arc lights free of expense to the exhibitors. A limited number of arc lights will be supplied for private lighting on the following basis, viz.: The consumer shall pay the cost of wiring. The consumer shall pay for service from May 1 to Oct. 30, 1893, at the rate of \$60 per lamp of 2,000 nominal candle power. Lamps will be suspended from the ceiling and furnished with opalescent globes. If any special fixture is required, it shall be furnished by the consumer. All care and attendance to the lamps and circuits will be furnished by the World's Columbian Exposition without extra charge.

Electricity for Charging Storage Batteries.—The consumer shall provide lines and all material necessary from the local switchboard from which the current is to be distributed to storage batteries. The consumer shall provide all necessary labor and attendance connected with the charging or handling of the batteries. Current will be provided 110 to 220 or 500 volts, at the rate of 10 cents per electrical horse-power per hour.

manner of securing them to the main shafts must be approved by the Director-General. A charge of \$50 per H. P. will be based on the maximum rate of power supplied. The diameter and revolutions of shafts will be given to the consumer at the time of the execution of the contract providing for power. To insure the safety of visitors, exhibitors will be required to inclose all machinery in motion with a railing of uniform height 2 1/2 ft. above the floor level.

Pipes Crossing Passageways.—No steam or water pipes will be allowed to cross over passageways, except as specially provided for in Group 60, Class 417.

Water Pressure.—Water pressure will be that due to a head of 200 ft. or a pressure of 86 lbs. per square inch.

Engineers and Firemen.—Exhibitors furnishing machinery, such as engines, boilers, etc., for the use of the Exposition may select their own men to operate them, subject to the approval of the Director-General, their wages to be fixed by the Director-General, subject to the approval of the Council of Administration.

Mines and Mining Building.—Power for the Mines and Mining Building will be electricity and compressed air.

Mannocitin.

A new rust protective coating, which, though very recently discovered, is used by several government departments and large firms in Germany, has recently been introduced here under the name of "Mannocitin." It consists of various greases, specially treated and mixed with etheric oils. Its consistency resembles that of vasoline, and it can be laid on with a brush in a very thin layer. When applied, it is stated that the oils soon evaporate, leaving only a neutral grease coating, which is claimed to be absolutely free from acid, owing to which it does not turn rancid and resists all atmospheric changes and the influence of sea water. It can be easily removed by rubbing cotton waste saturated with turpentine over the coated surface. It does not harden, and is colorless, and it is claimed does not discolor polished metals in any way, while effectually protecting them from oxidation.

Any further particulars may be obtained of Messrs Vilmar & Goetz, of New York.

Cable Crossings at Third Avenue.

The Jonson Engineering & Foundry Co., of New York City, will complete this month the cable crossings for the Third Avenue Railroad at 125th street and Third avenue, New York, on which work has been carried night and day for a month. The work is difficult as the cable has to be depressed and the elevating machinery put underground.



ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinion, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE developments in the Panama Canal prosecution up to to-day are mostly political, but now the case becomes more interesting to engineers, as engineers. The trial was formally begun on Tuesday of this week. Among those indicted are Ferdinand de Lesseps, Charles de Lesseps, his son, Director of the Panama Canal Co.; M. Fontane, Secretary-General of the company, and M. Eiffel, the engineer, whose name is famous all over the civilized world. M. Ferdinand de Lesseps did not appear in court because of his physical inability. The examination of M. Charles de Lesseps will probably lead to the implication of several eminent men whose names have not yet been seriously brought into the matter. M. Eiffel is indicted as an accomplice and the indictment states that he secured 90,000,000 francs of the company's money. Such details of the evidence as reach us reveal a most astonishing and widespread corruption, and a system of blackmailing unequalled in history for its rapacity and its success. But the feature of the whole affair which seems to us the saddest and most hopeless is the abject cowardice that is revealed. Ordinary, everyday courage on the part of a few men would have stopped the clamors of the whole nefarious gang of "statesmen," bankers, editors, men of affairs and men of the world, who rushed to the office of the company whenever a new issue of bonds was made. But courage seems to have been entirely wanting, and the surrender to the "jobbers" was complete and humiliating. M. Eiffel apparently stands a self-convicted rascal. He received 6,000,000 francs for taking to pieces, shipping to the Isthmus, and erecting there machinery which he never even supplied in France. He took 2,875,000 francs from one works as commission on a contract never executed, and a government accountant testifies that he made 33,000,000 francs on his contracts. If he is proved to have been as unscrupulous as it now seems probable he was, he ought to be expelled from all the societies of engineers to which he belongs. So far, the scandal has not involved anybody in the United States, but it is suspected that there are several nervous people on this side of the water, although the company never succeeded in taking any considerable amount of money out of this country, however much it may have sent here. The matter comes up at an unfortunate moment for those who are urging the indorsement of the Nicaragua Canal bonds by the United States, for it will tend to make Congressmen and the public much more cautious than they would otherwise have been. So far as the public is concerned, we cannot help thinking that this is rather fortunate than otherwise.

A newspaper which prints three columns to set forth two inches of plain facts is pretty sure to defeat its own object; but for the benefit of those readers who may have received only indirect information or who have read the headings only, we will mention the fact that the dozens of columns lately published in the New York Times concerning Canadian traffic affairs have been nothing but "rot." That paper has rehearsed the same matter day after day, about the horribly un-

just attitude of the Canadian roads, especially the Canadian Pacific, toward American railroads, and the generally deplorable condition of all traffic regulations connected with freight to or from Canada. The substance of the plaint is that the Canadian Pacific enjoys too many advantages at the hands of the United States Government. The real merits of the case are pretty well known and we shall not take the reader's time to discuss them here. There are so many conflicting interests that the relations of the Canadian roads to those this side of the line are not likely to be materially changed by legal enactments for a long time to come. But it is worth while to note that President Van Horne has demolished practically the whole of the Times' fabric by a single letter. He says that there is practically no restriction of traffic by any discriminative duty on tea, and that most of the Asiatic traffic taken from or to this country would simply revert to the Suez ships if he did not get it. He reiterates in emphatic terms the assertion that his traffic officers are forbidden to violate our Interstate Commerce law. He continues:

The "long and short of it" is that if the Canadian railways were out of the way there would be just so many less factors to deal with in arranging rate combinations; and therefore the most outrageous misstatements to the disadvantage of the Canadian railways, and the Canadian Pacific in particular, are industriously circulated, doubtless at great expense. Is it, think you, to enlighten or deceive the public that the United States freight carried by the Canadian Pacific is invariably given in pounds instead of tons or carloads? Is it not put in this way in the expectation that the public will not take the trouble to reduce pounds to tons or carloads, and that the impression will be created that what is really insignificant is something immense? Is it for an honest purpose that the Canadian Pacific is made to appear as extravagantly subsidized? That false figures are persistently quoted in respect to these subsidies, notwithstanding that the clearest possible official information is readily available? That cash deposited by the company with the Government as trustee, to secure the payment of dividends on its stock, is made to appear as a subsidy? and that the loans of the Government to the company, which were repaid with interest years ago, are made to appear as subsidies? . . . The secret rates of our competitors do not become known to the public, and therefore the openness and straightforwardness of our policy are made to appear to our disadvantage. Our indisposition to attend meetings and to enter into rate agreements has been the cause of much complaint on the part of our competitors, but we have no time to waste in making agreements with presidents and managers who will permit their subordinates to violate their obligations with impunity. . . .

Theory Versus Facts in the Minneapolis Wheat Traffic.

The decision of the Interstate Commerce Commission in the Minneapolis wheat rate case is in line with its previous treatment of the Eau Claire lumber complaint. In both cases the Commissioners attempt to satisfy what they regard as theoretical justice, in the face of commercial conditions as they actually exist. The Chicago & Northwestern does not reach Eau Claire, and, as was its legal right, it made the Winona lumber rates less than the tariffs charged Eau Claire by the St. Paul company, in spite of the decision, and there that matter still rests. In the present case the wheat-growing sections of the Red River Valley are equidistant from Duluth and Minneapolis by the Northern Pacific, the same rates being charged by that company on wheat to both cities. The Great Northern from the same points has a more roundabout line to Duluth, so that Minneapolis, by that route, is nearer to the wheat fields than Duluth. The St. Paul road has a still longer line to Duluth (via the Fargo Southern to Minneapolis and thence over the St. Paul & Duluth). All the roads have been compelled to follow the lead of the Northern Pacific in making the same rates from Red River towns to Duluth as to Minneapolis.

The Commission decides that all the companies except the Northern Pacific must reduce wheat rates to Minneapolis below those to Duluth, according to a schedule of distances measured by those lines of the defendants which are undeniably longer to the latter city. Recognizing that the Northern Pacific holds the key to the situation, and, further, that the order of the Commission could not reach that company, the decision (as in the Eau Claire case) proceeds to plead with that road. After stating that some of the defendants had a shorter line (say from Fargo) to Minneapolis than the Northern Pacific's road, the latter is politely told that this fact ought to control, and that the road will be held harmless before the Commission if it will but allow the other railroads to reduce Minneapolis rates below Duluth as commanded by the decision. If, however, the Northern Pacific should insist on keeping the two cities on a parity and so reduce the Duluth rate by the exact amount of reduction commanded for Minneapolis, then the obedient defendants "would probably immediately reduce their Minneapolis rate again and thus frustrate any advantages the Northern Pacific might seek by inaugurating the original reduction to Duluth. The result of any such proceeding

would manifestly be highly injurious to all the roads, and it can hardly be supposed that the Northern Pacific will undertake it."

This can scarcely be called strong reasoning. The Commission has made a slash at a difficult knot, but cannot be said to have cut it. Commercial knots must be untwisted, not cut. The fact that it is shorter by some other line from Fargo to Minneapolis than by the Northern Pacific, it is asserted, fixes the ethical right of Minneapolis to a reduction which the longer route at a greater cost must of course meet. But that line's natural advantage on the Duluth side is overlooked. If distance is a factor in the one case, it ought to be in the other; so that Duluth would apparently have a good case against the Northern Pacific on the theory of the decision, should lower rates be granted Minneapolis by that line, since Duluth is a few miles nearer the wheat section.

The whole matter shows once more the difficulty of attempting to solve such questions by the application of abstract ethics. When we ask whether a road or roads ought "of right" to be forced to do certain things in the face of competition by another road whose rates are acknowledged to be fair, we raise some troublesome questions. According to that theory, carried to the extreme, every town back in the country has "a right" to a railroad, and its business is "discriminated against" by just the cost of the extra haul by wagon. Commercial right to a certain trade in the ordinary run of business is not a tangible asset. Of course it is possible that the Northern Pacific may consent, in the interests of peace, to some compromise which will leave to it some of the advantages of its position, while at the same time yielding a little to the wishes of the Commissioners; but there is no power in the Commission to compel such reductions. The decision might have counseled the Minneapolis millers to force a reduction *vi et armis*—that is by building or buying up a railroad in their interest, for the geographical position of at least one of the existing roads is against their claim for a differential.

Traffic Affairs in 1892.

A formal review of the traffic affairs of the railroads in this country for the past year is of no great importance to the readers of the *Railroad Gazette* just now, for two reasons. One is, that our review of the Interstate Commerce Law, and public opinion concerning it, which was printed on June 3, summarized the subject up to that time; and the second is, that practically all of the events in this department of the railroad world, aside from those of a legal sort, have been of a minor nature. Everything that has been done since June, by Congress and other public bodies, concerning the relation of the Government to the railroads, is still in an unsettled condition, so that no summary of results is possible. The chief point of interest is that concerning the expediency of pooling, and on this a proposition is now pending before Congress.

But though the questions concerning the law are unsettled, and the other events are not of commanding importance, a statement of these latter may not be without interest, and we will therefore give a brief list of them, arranged mostly in chronological order.

We will first note the principal decisions of the courts during the year. Some of these have important bearings, aside from their relation to the technicalities of the Interstate Commerce law. The Counselman case was decided by the Supreme Court Jan. 11, 1892. The decision on the case of Milton Knight was given at Springfield, Ill., Feb. 29. This is not unlikely to be far reaching in its effects on tariffs, and rate regulation generally, to points in foreign countries. The decision of Judge Jackson, at Cincinnati, sustaining the legality of one-way party-rate tickets came in May. The decision in Texas restricting the arbitrary powers of railroad commissions; that of Judge Brewer giving a novel, not to say unreasonable, construction to a paragraph of the Interstate Commerce law; and Judge Gresham's refusal to play second fiddle to the Interstate Commerce Commission, are all fresh in the minds of our readers. Judge Riner's decision that a traffic association is not an unlawful "trust" is also recent.

The Interstate Commerce Commission has issued few decisions of consequence during the year, owing largely, no doubt, to the fact that several of its members are new to the office. The Eau Claire lumber rate decision in August, and that on the long and short haul section, reported in the *Railroad Gazette* of Dec. 2, are the most important. Both of these took sound views, generally speaking, but they dealt with unsolvable problems.

The doings of the railroads themselves do not make a long list. In August the roads between Chicago and Denver carried thousands of passengers to the latter

city and back at a rate of \$12 for the 2,000 or more miles. The responsibility for this low rate is laid upon the Atchison, which in turn alleged that its competitors had made secret prices or concessions which justified this rate; and a board of arbitrators has decided that the Atchison was right, though without making the details public. In October the Pennsylvania and the Baltimore & Ohio, in carrying passengers to the Grand Army of the Republic encampment at Washington, handled—at half fare—what may be called one of the largest excursions that ever traveled by railroad, and one which disarranged freight traffic in an unprecedented manner. No one pretends that these large movements at such low rates, voluntarily made, afford any profit, in the legitimate sense of that term, and the question whether the ultimate result is not a loss, is an important one which seems not yet to be definitely decided. Sharp competition has kept passenger rates between Chicago and the Ohio River far below the normal standard for several months, and the prospect of restoration is not bright. The Chicago & Alton has used nothing but limited tickets—practically continuous passage tickets—a year, and finds great satisfaction in the reform, and several other roads have followed its example. There is still business for the Chicago scalpers, however, and the attempts to squelch them still appear to be feeble.

The Southern Railway & Steamship Association, after 25 years of comparatively peaceful existence, has found it necessary to adopt more absolute methods—methods more like those in vogue where destructive warfare is common—to repress reckless rate cutting. The Western Traffic Association has gone to pieces, but the results of this dissolution will not appear until the grain movement in the West falls off enough to seriously reduce the income of the roads. Then competition will become sharp again, and we shall see what we shall see. The Trunk lines have decided to make more extended use of the principle of differential rates, but this move is also one whose results are yet to be seen. The promptness with which Mr. Walker was engaged as one of the men to supervise this movement is an interesting indication of one of the recent tendencies in railroad management.

The Trans-continental lines have abolished their subsidy to the Pacific Mail Steamship Company. The agreement between the Philadelphia & Reading and the Central of New Jersey, with the other new relations of the Reading, have doubtless had an important influence on the freight rates for anthracite coal. Some rates have been definitely advanced. Very likely others have been held up which, without this agreement, would have gone lower. This is one of the events of the traffic world, though not one that can be explicitly recorded, and the permanency of the Reading's arrangements for stimulating the coal business is still questionable. The railroads have shown more decisively than ever their ability to compete with so cheap a water way as the Erie Canal. Wheat has been taken in cars from Buffalo to New York for 2½ cents a bushel, and, it is alleged, in a few cases, at 2½ cents. The question of lighterage or terminal charges—of how much of these was allowed out of the freight rate—makes the discussion of the cost and profit of this transportation unsatisfactory, but there seems little doubt that large quantities of grain have been moved by rail at about two mills per ton mile, and presumably without loss to the carrier.

Two episodes which received more attention than they deserved were the question of reduced passenger fares to Chicago during the World's Fair and the extension of Philadelphia & Reading interests in New England railroads. The former question will not be a practical one until the business begins, for the rates decided upon—\$28 to \$32 from New York out and back—are low enough for most of the regular trains, and the question of extra trains will depend upon how many cars can be spared from the regulars; and the second matter will not be practical as a traffic question for a long time yet, for there would be but little increase in rail traffic between Pennsylvania and New England even if prices were reduced one-half.

Readers desiring to make a general survey may regard the foregoing as in a sense matters of detail, which is true; but a notice of the volume of traffic and the course of earnings throughout the year does not come within the scope of this article. The railroads of the South have had hard times the whole year on account of the low price of cotton and the resulting stagnation of business. The grain carrying roads have had a large business, but have not made large profits on it.

The traffic departments of the railroads are, or should be, deeply interested in the increasing enlightenment of the public on railroad economics, and in this view of the case numerous magazine articles of the

year deserve notice in this place, notably those of Walker, Hadley, Schoonmaker, Henry C. Adams and Acworth. The rapid enlightenment of the public by the processes now going on is constantly working a change in the nature of the traffic manager's problem, and he should therefore keep well posted on the progress of the movement.

Some New Light on Exports of Locomotives.

We fear that the locomotive builders of the United States have little notion of the remorseless vigilance with which their iniquities are watched on the other side of the Atlantic. Here they have been going on quietly smuggling their product out of the country on jackasses and in bunker boats, at the rate of from 6,000 to 11,000 locomotives a year and making us believe that they only exported some 150 or less. But the English editor cannot be fooled all the time, neither can all the American editors. For instance, *Industries and Engineering News* are wide awake and find out the truth about things. Our English contemporary recently said, speaking of American competition in South American and Colonial markets:

The total number of locomotive engines exported from the United States has varied, over the last ten years, from a maximum of 10,945 in 1882, to a minimum of 6,411 in 1886, the number exported for the year 1891 having been 8,815. This represents a very large business, and it behooves the locomotive builders of this country to inquire into the secret, if any there be, of the success that has been gained by American locomotives in neutral markets. Is it due to their greater cheapness, or to their superiority of results; and if to their cheapness is it possible that English builders are following a wrong system, either in reference to the principles of construction adopted, or to the possibility of producing work that costs too much money—in other words, is too highly finished—relatively to the results sought to be obtained? It certainly appears to be inexplicable, on the face of it, that the United States should be able to compete so successfully in markets that English manufacturers would probably otherwise occupy.

We should say that this does "represent a very large business," and that it is indeed "inexplicable on the face of it." With our feeble lights we should not have tried to explain it otherwise than to say "the boy lied;" but if we had the ingenuity of our contemporaries we might have taken the explanation suggested by the words of a recent writer in the *Engineer* who says "our producers [the English] have reduced prices to the minimum, decreased cost of production by improved machinery and adulteration, and still are unable to hold their own in the home market or what are called neutral markets." Here are two possible explanations of our exports of 8,815 locomotives to "neutral markets" in 1891. (By the way, we are grateful for the accuracy of the 15. The casual editor might have been contented with 8,800 and odd.) The explanations suggested by the quotation from the *Engineer* are that perhaps the neutral markets don't like the high adulteration of English locomotives; or perhaps American builders have beaten the Englishmen at their own game of adulteration. These are questions for more investigation than we can now stop to make; the reader will perhaps like to carry on the speculation himself, and seek still other explanations. But the editor of *Engineering News* does not begot himself with any such subtleties. He accepts *Industries'* figures and then tells us just why our exports of locomotives have reached such surprising numbers. We seem to remember having read something of the same sort before, but fresh statements of old truths is part of the capital of ministers and editors. In his mind these are the reasons:

There are none so blind as those who will not see. . . With a curious perversity they [the English editors] have refused to recognize the fact that the best locomotive is the one which will handle a given traffic at least cost; and that it is in this and not in any minor mechanical details, concerning which there is much to be said on both sides, that the great superiority of the American locomotive for American traffic (and so far as Americans can see for British traffic also) is to be found. Because the conditions of traffic in Australia, South America and most other countries undergoing rapid development resemble the conditions in the United States rather than those in Great Britain, the American locomotive, notwithstanding great commercial disadvantages, has been able to compete with its English rival.

After this what shall we say of the Bureau of Statistics of the Treasury Department of the United States, which continues to mislead us with figures pretending to show that our total exports of locomotives for 18 years, from 1875 to 1892, were but 2,168, and that for the last 11 years they have averaged only 150 a year? The table below gives the number of locomotives exported each fiscal year and their value as drawn from the reports of that bureau:

Year.	No.	Value.	Year.	No.	Value.
1875	79	\$906,639	1885	85	\$742,403
1876	44	561,559	1886	52	3,333
1877	53	568,302	1887	58	372,245
1878	98	1,016,974	1888	56	407,014
1879	73	507,802	1889	144	1,227,149
1880	60	496,313	1890	161	280,006
1881	99	893,123	1891	275	2,424,363
1882	135	1,455,717	1892	197	1,717,715
1883	219	2,219,084			
1884	282	2,819,946			
				2,168	\$20,071,344

These figures have all been printed in the *Railroad Gazette* before, except those for 1891 and 1892. We shall not attempt to account for their amazing inaccuracy.

The Reading's Position.

At the annual meeting of the Philadelphia & Reading last Monday full interest was declared to have been earned on the three series of preference income bonds of that company, but this practical showing of prosperity for the Reading system was offset by the further announcement that over \$5,000,000 had been borrowed to carry coal on hand and pay for capital expenditures, and that the Central of New Jersey, under legal proceedings in that State, had withdrawn from the combination.

This withdrawal means, not only that the lease is abrogated, as was announced months ago, but that no effort will be made to get the courts to permit its renewal. The newspapers make much of this, and some of them indulge in various speculations, but the significance which they attach to the withdrawal is largely fictitious. It has long been an open secret that the lease of the Central to the Reading had proved disappointing to the lessor company. One per cent. additional dividend had been guaranteed, and, from current accounts, had not been earned. It was demonstrated to the satisfaction of the Central directors that the lease had brought them much public censure and no profit. A year ago Cox & Brothers & Co., the largest coal operators outside the great corporations, made a contract with the Reading which took from the Central about a million tons of coal a year. Under the combination to advance and hold anthracite prices, all the roads embraced in the combination adhered fairly well to their agreed percentages, but the result of this was that the loss of Cox Brothers & Co.'s coal was not made up to the Central. On the other hand, as long as the Reading and Central stocks are in the same or friendly hands there is no danger that the Central will do anything against the general welfare; hence—so all thought—it would be just as well to separate the Reading and Central legally and stop so much public complaining and legal annoyance in New Jersey, while still managing the two companies for the common end. It was stated that at the close of the Reading fiscal year, Nov. 30, that company owed \$1,000,000 or \$1,500,000 to the Central and Lehigh Valley roads under the terms of the lease.

Up to the close of the fiscal year the Reading was successful in its attempts to obtain a better price for anthracite. Every one who examines the subject dispassionately must come to the conclusion that the selling price of anthracite has been too low, below the cost of production at times. But it has been, and still is, a question whether high prices can be maintained. To state the situation more fully a few rough figures may be given. The gross output for 1891 was 40,448,000 gross tons, and for 1892, 41,800,000 tons, an increase of 1,350,000 tons. In this increase the Reading system, of course, ought to have shared. The real drift of things is, however, shown by the increases and decreases in the output by companies. Here the Delaware, Lackawanna & Western and the Delaware & Hudson are seen to have mined and sold 1,000,000 tons more than their proportion, which, with the increases of the smaller carriers, swallowed up the whole of the total excess of the year, the Reading and the Central of New Jersey together having carried about the same tonnage as in 1891. Thus, practically, it appears that the Reading formed the combination, taking the odium of advancing prices to consumers, and to reach the result, restricted sales (though not always the mining) of coal, only to find at the close of the year that the two independent companies had mined and sold 1,000,000 more tons than in the previous year, of course at the higher prices forced by the Reading. It is understood that the internal difficulty of the whole combination problem is just at this point—a fair division of the profits. If a permanent understanding can be reached the whole anthracite trade—excepting always the consumers—may reap good profits during the coming year. The working out of the experiment will be watched with interest.

The United States and the Nicaragua Canal.

The plan to have the bonds of the Nicaragua Canal Company guaranteed by the United States government will unquestionably be pushed very hard at Washington in this session. It is impossible to foretell what the result will be, but both parties are committed by their platforms to government aid of the project. But considering the vast importance, not only to the whole world, but especially to this nation, of the step which is urged, it is the duty of every citizen who may have any influence in the matter to consider somewhat the ques-

tions involved, and to try to decide whether or not he can recommend that the nation shall commit itself to the aid of the Nicaragua Canal on the basis of the knowledge now available. To this end we have made some study of the subject and have collected such data as we could. It has been our purpose to consider it without prejudice, and not merely from a theoretical standpoint, but having regard to the practical matters involved.

We find at the outset that nearly all the reports before us are favorable. It appears that our government has unstintingly devoted attention, time and money to surveys, examinations and reports, and has printed and spread these reports broadcast over the country, particularly when they were favorable. The departments of the government have all been drawn on. The navy especially has figured extensively in the matter, as the project from the start has been promoted by some prominent naval officers. Officers of the coast survey, the army, geological survey and the ordnance department have been ordered to examine and report; and finally a committee of civil engineers was employed by the canal company to examine the plans and make a report upon them. Of all these reports only one seems to have been considered unsuitable for distribution, and the apparent reason for so considering it was the excess of some of the estimates over those made by the engineers of the promoters.

There appears, therefore, to be no real necessity of presenting again the favorable side of the question, for not only these reports, but the proceedings of several called canal conventions and the statements in the press of the country, have presented in such favorable light, and so widely, the great advantages of the canal in every way that the whole country knows all about them. It is to some doubtful questions and unfavorable conditions that we desire to call the earnest attention of the people, and of Congress particularly, now legislating upon this important matter.

Rainfall.—One of the chief meteorological conditions affecting the construction and maintenance of the canal is the rainfall. An important related physical condition is the soils affected by the rainfall. In the early reports and up to 1885, the engineers in charge of the surveys believed that the annual rainfall was about 100 in. on the Atlantic slope; which is no insignificant amount, particularly as most of it falls in a few months of the year. This fall is often very heavy, and widely distributed over the watersheds of the rivers, which in all countries of heavy rainfall are very numerous and are at times powerful torrents, uncertain and destructive.

We are surprised to find that the results of later, and no doubt more careful, observations conflict with all the previous results. The total amount of rainfall at Greytown on the Caribbean Sea in 1880 was 296.94 in. This gives an average monthly rainfall of 24.75 in., about one-half of the annual rainfall of the more rainy portions of this country. The greatest monthly rainfall was 52.55 in., a good rainfall for a year in our rainy belts. The average daily rainfall of the three months of June, July and August was nearly $1\frac{1}{2}$ in., July leading with 1.69 ins. In 1891 the annual rainfall was 214.27 in. All these records show an uncertain, variable rainfall of immense volume. There is no record in our possession of the maximum weekly or daily rainfall. This would be interesting and important.

The hope is entertained by some of the writers on the subject that farther inland the rainfall is somewhat less. If it is so, it is contrary to the usual conditions, as the rainfall along the Gulf of Mexico and elsewhere in Central America generally increases toward the interior until the tablelands or higher grounds are reached, so that on the watershed of the San Juan and San Carlos and tributary streams we should expect to find a still greater rainfall than on the coast, and the reason for this is found in the conditions given in the company's prospectus. The trade winds, blowing almost continuously, strike the coast laden with moisture, "the surplussage of which is condensed by the cooler air of the higher Atlantic slopes of the Cordillera and precipitated." It is reasonable to expect that the rainfall would be greater where the obstruction is met than immediately on the coast where the country is low and flat. We have given this important condition considerable space, as it has been scarcely mentioned in the reports as having any special bearing on the plans of the works, or their maintenance. But when he considers the very extensive and formidable works that must be built and maintained to take care of the water of the streams, and the nature of the ground, every engineer will recognize this as one of the most serious elements of the whole enterprise.

Temperature is another climatic condition deserving of at least passing notice. It is generally known that the thermometer does not always indicate the depressing nature of the climate, but rather the temperature and the humidity combined must be considered. We can understand what the humidity must be in a country where nearly every month has a considerable rainfall. The average maximum temperature for each month in 1890 and 1891 was about 84.5 deg. F.; the average minimum about 72 deg. Under such climatic conditions of humidity, rainfall and temperature, with no cool seasons to recuperate the vital strength, it cannot be expected that labor can be performed equal in amount to that performed in temperate regions. This is too well known to need further statement.

Constructive features.—We do not intend to go into details of description of the plans proposed, but must assume that our readers are more or less familiar with them. Generally it may be stated that one of the main features of the plans is the damming and impounding of large volumes of water in order to make slack-water navigation. It is to this that we address our attention chiefly, discussing as we proceed other incidental matters of importance.

A general knowledge of the materials to be encountered in the work and to be used in construction is necessary to form a correct judgment of cost of removal, of the stability of the slopes, and of other important matters. The geologists are of the opinion that the sands on the watersheds are volcanic, composed largely of "volcanic ashes and lapilli which lie unconsolidated just where they were thrown out and showered down from the active volcanoes of that region." "As far as is definitely known, basaltic lavas predominate along both the Panama and Nicaragua canals." The italics are our own for the purpose of calling especial attention to this remark, which is made by a very prominent authority. The disasters at Panama from establishing slopes unsuited to the material teach a lesson to be heeded. The immense amount of loose volcanic sands washed down stream by the San Carlos and its tributaries has also an important bearing on the maintenance of the channels, for these sands are to be caught in the stillwater basin to be formed by the great dam at Ochoa, across the main San Juan River.

The engineering treatment of very important physical conditions is radical in the extreme. The volumes of water to be controlled and of materials to be handled are enormous. The canal is to be and must be fortified against seas of running water, concentrated under an extraordinary rainfall into destructive torrents, as indicated by the immense number and extent of embankments and waste weirs provided everywhere in the hope of saving the works from destruction under even ordinary conditions. The threatening nature of these conditions can best be appreciated by grouping the data about dams, embankments, sluices, spillways and waste weirs, also about volumes of water and sediment.

The line of the canal through its entirely artificial course from Lock No. 1, about 10 miles from Greytown, to the dam across the San Juan River, a distance of about 23 miles, is across the drainage of this country of heavy rainfall. This gives an undulating profile and produces a succession of ridges through which the canal must pass and with corresponding depressions between the ridges, which must be filled by very substantial dams in order to prevent the escape of the water which is to be turned into these artificial basins. The entire 23 miles, with several more (about 10) along the lower side of the San Carlos River, to hold this stream up also above the country, say 33 miles in all, is a succession of cuts and reservoir embankments. One not familiar with the ground in detail cannot safely state the extent of such work required. He is, however, likely to understate it.

In the Deseado River basin, between the first lock and the San Francisco River basin, there are half a dozen or more heavy embankment, with a maximum height of 70 ft. and an average of 20 ft., with an aggregate length of 11,000 lineal feet. The several lakes formed by these dams must be provided with waste weirs. In the San Francisco basin the works of this kind are heavy and "very numerous"; eight of them will be 60 ft. or more in height. There is no solid masonry material; the facings of the locks must probably come from the United States. There is no earth suitable for embankments, and they must therefore be built of loose rock out of the cuts; and waste weirs must be everywhere provided. The canal cuts across the Chanchos River and the Santa or Florida basin and river, embankments being required here also.

The most important work, and perhaps the one most beset with difficulties and doubt, is the great Ochoa dam across the main San Juan River, three miles below the mouth of the San Carlos; which latter river is really the main river, the San Juan being simply the outlet of the lake, and about 60 miles in length from the lake to the mouth of the San Carlos. This dam has a maximum length of 1,900 ft., and the height is about 70 ft. The difficulties of constructing this dam arise from the fact that there is no material suitable within 18 miles with which to build it, and even that is loose volcanic rock; and from the uncertain character of the bottom and the immense volume of water to be handled and dammed back. The spillway, here and along the San Carlos must take care of some 50,000 or perhaps 100,000 cu. ft. of water per second, equal to one-tenth of the volume passing into the Gulf at the mouths of the Mississippi River at floods and equal to one quarter of the entire volume falling over Niagara Falls.

The maximum height of the San Carlos dams is 60 ft., and there are in addition to the large embankments 59 others. The total length of these San Carlos dams is 16,770 ft., nearly $3\frac{1}{4}$ miles, and the total length of weirs and sluices is 4,750 ft., nearly one mile.

The work concentrated at Ochoa and vicinity is unprecedented, if all the conditions be considered, such as the deep sand overlying the foundation rock, the great volume of water, and the want of good materials. The plan of operations proposed is to build a railroad about 18 miles from the great divide cut and dump the stones

into the river, "allowing them to find their own resting-places." We think no one has yet calculated how far down-stream will be found the "resting places." The method is described in detail in the report of an ordnance officer who examined the ground. It is certainly a unique method and evidently involving some little uncertainty as to what is going to happen finally. We cannot do better than to quote the statement relating to it.

"After much reflection I am fully convinced that the project will be a successful one, and that no serious objection to it can be raised. Sooner or later the stones thrown in must find resting-places, whatever the volume of water may be that flows over them. In time and by accretion a barrier will be formed raising the level of the water behind it. This will produce a hydrostatic pressure, one effect of which will be to wash out the sand in which the first blocks are imbedded, causing them to sink. As the barrier rises this action will become more pronounced, the layer of rocks sinking lower and lower until they strike bedrock. Meantime many of them will be carried down stream, perhaps far down, to still water. But, eventually, all must reach resting-places. . . . The final slope of the lower face of the dam cannot be foretold. It will depend largely upon the size of the blocks. But there is little probability of its exceeding 1 on 8, and none whatever of its exceeding 1 on 10, provided that two-fifths or more of the entire mass is composed of blocks weighing one ton or more. . . . With a slope 1 on 8 and an upstream slope of 1 on $1\frac{1}{2}$ the cubical contents of the dam may be roughly estimated at fully 1,600,000 cu. yds."

A cross-section of this dam with an upstream slope of 1 on $1\frac{1}{2}$ and a downstream slope of 1 on 8 and perhaps 1 on 10 would appear very formidable with a height of 70 ft., the base being, say, 800 ft.

The dam required on the west side of Lake Nicaragua, across the Tola River basin, is 1,800 ft. long and 70 ft. high. There are no doubt other embankments, dams and waste weirs which the detail plans would disclose; but getting together those above mentioned, we find that the total length of the dams or embankments (they are all dams) cannot be less than 8 or 9 miles, running from 20 to 70 feet in height, with probably three miles of spillways. The bare statement is sufficient to impress the extraordinary difficulties and dangers upon the mind of those at all familiar with the forces to be controlled.

The great divide cut is also a stupendous work. Even with the canal cross-section and the slopes proposed there are in it 10,000,000 cu. yds. of excavation, "of which about 3,000,000 yds. are surface soil and decomposed lava, and 7,000,000 are solid lavas and indurated or consolidated beds of volcanic ashes of about the hardness and consistency of slate rock." These terms are very suspicious and indicate the presence of material that will not stand vertically or $\frac{1}{2}$ to 1, which is practically vertical. It would be interesting to compare the material with that in the great cut on the Panama Canal, which was planned on the basis of a 1 to 1 slope (five times flatter than the Nicaragua slope), but was found to be unstable. Assume for a moment that the material is similar in its instability to the summit cut at Panama, and that the slopes may have to be taken out on 2 or 1 on 3 as in the Panama Railroad cut at the Culebra, what would be the cube to be extracted in a cut 2.9 miles long with a mean depth of 141 ft. and a maximum depth of 330 ft.?

Silt.—An important condition exists at the mouth of the San Carlos, which will discharge its waters into the artificial basin above the Ochoa dam and into nearly still water. This river brings down large bodies of sand and silt. The dam at Ochoa forms a long, narrow lake the present mouth of the San Carlos, and into this first will be thrown the sedimentary matters which at no distant period will reach the San Juan and the canal entrance. This accumulating deposit will advance continuously nearer and nearer to the San Juan. What current there is in the San Carlos and the San Juan will set toward the dam, immediately above which is the canal entrance, and this will draw a portion of the suspended sediment in that direction and to near that point, where most of it will be deposited exactly where it is not wanted. We consider these conditions very prejudicial to the maintenance of the canal prism.

Lake Nicaragua, which is always spoken of as furnishing unobstructed and free passage to vessels of the largest class, is obstructed on the east side by a long, flat shoal where it will be necessary to dredge and maintain a channel 14 miles long, for which we find no provision for maintenance. It is very doubtful, even with the wind off shore, if this channel, dredged in soft material, can be maintained without constant and heavy dredging.

The questions of practicability and cost of the restoration of the ruined harbor at Greytown, and of the cost of building one at the present open roadstead at Brito, on the Pacific, are important and full of difficulty. We need not discuss them. We have touched upon only a few of the many serious problems which we believe are yet unsolved, and have discussed only the more important conditions relating to construction and cost. We come now to the still more important question of operation.

Operation.—In order that the matter may be clearly presented, we have made a sketch showing a comparison between the present (enlarged) section of the Suez Canal and those proposed at Nicaragua. It is claimed by the promoters of the Nicaragua Canal that they have learned, from the inadequacy of the Suez Canal to properly handle 6,000,000 tons of shipping per annum, that the section should be greatly increased, especially as

they expect a business amounting soon to 12,000,000 tons; but how far short they have come of the dimensions now being made at Suez at a cost of \$40,000,000 will be seen by the comparative sections and particularly by the graphical showing of these sections. In this comparative showing we have given the area of the immersed section of an ordinary Peninsular & Oriental steamship in order that it may be understood why we question the ability of the Nicaragua Canal to take even this comparatively small vessel without danger and great delay. The beam of the steamship which, it is claimed, is provided for in the Nicaragua section, is 52 ft. instead of 45 ft., as shown in the sketch. But a vessel of 52 ft. beam is by no means the final craft for which the canal should provide. Transatlantic liners are now building of 63 to 67 ft. beam, and good authorities expect to see them with 70 ft. within a few years. The war vessels afloat and building in the navies of the United States, England and Italy have 63 to 74 ft. beam and 26 to 30 ft. draft, and cross sections of 50 per cent. more area than the P. & O. steamer shown in the sketch.

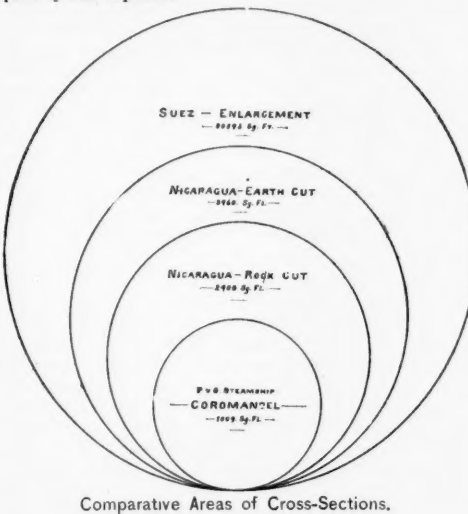
Admitting that provision for 52-ft. beam is enough would it be possible to navigate an 80-ft. vertical-faced, rock channel with only 14 ft. to spare on each side providing the vessel was exactly in the centre?

Experience has shown that a vessel moves through artificial channels with great difficulty if the channel is not at least five times the area of the ship's midship section. This matter is too important to lightly dismiss it. There are sound scientific and practical reasons for making a large section. These large sections can be shown to be absolutely necessary to insure the practicability of operating the canal and to enable it to compete with other routes. We will notice a few of these reasons. No one has to our knowledge made such extensive experiments or stated the reasons of retardation in restricted channels so fully and clearly as Mr. Scott Russell in his work on Naval Architecture. We give therefore a statement from him bearing on this point.

"The water excavated from the way of the ship causes a continual accumulation of water in the region of the canal towards which the ship is moving. . . . If the wave travel ahead of the ship only one-fourth of the pace of the ship, the accumulation will be quadrupled; one-eighth will make it eight-fold, and so on, until the progress of the ship becomes extremely difficult or impossible. This is what constantly takes place as the rise of the ship and the pace in a narrow and shallow canal become greater. Practically, working at high speed becomes not merely difficult and costly but impracticable. . . . The consequences of this rapid increase of head accumulation, which takes place as the speed of the wave in advance of the vessel diminishes, are very serious. First, it throws the ship's head up out of trim; next, it increases the pressure of water at her bow; third, it makes her travel up hill; fourth, it produces a backward current along her sides. And these hindrances to speed accumulate rapidly, much more rapidly than as the square of the resistance, until the amount becomes insupportable; that is, many times the resistance due to the law of the square of the speed. . . . It is now necessary to

about a mile north of Lake Timsah on a straight line, when the steamer got a sheer on her and away she went with her bows into the bank; the stern swung around and went into the other bank and there we stuck for more than hour. A friend of mine coming from Bombay in the next P. & O. steamer told me at Malta that his steamer met with a similar accident and lost two blades of her propeller. Now the canal is virtually straight and if such accidents happen there what may we expect in the curves of the Panama Canal or the Nicaragua Canal?"

Increase of velocity very rapidly increases the retarding force, and consequently the power required to propel vessels through restricted channels; in fact, it has generally been considered that the resistance to movement increases as the cube of the velocity, whereas it increases only as the square of the velocity in the free waterway of the ocean. For the above very good reasons all restricted channels are dangerous to operate at any adequate speed and the time required is great, and consequently the expense.



The canal prospectuses enlarge considerably upon the advantages this route is to give to sailing vessels now going around Cape Horn, but nowhere do we find any mention made of the cost of towing these vessels 170 miles through the canal, or any discussion as to the practicability of doing so. These are important questions, particularly to the United States, for the reason that we excel in this class of vessels and have large numbers of them to put on this route if an adequate one is provided. We have in our merchant marine, on the Atlantic and Pacific, about 14,000 sailing vessels, with a measured tonnage of nearly two millions; in fact, our sail tonnage is considerably in excess of our steam tonnage. What will be the time required to tow

army and civil engineers, employed by the general government and paid by it? This country cannot afford to imitate the French people by going blindly and without fully exhausting the question into any interoceanic canal scheme.

Railroad Abbreviations.

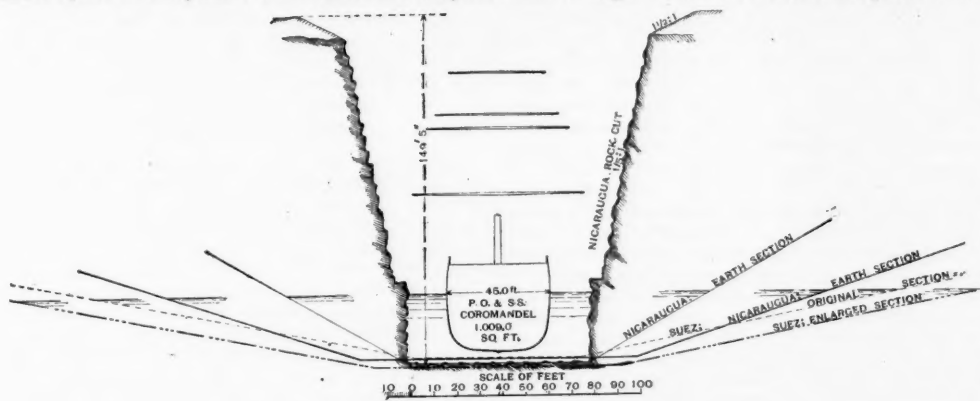
The American railroad man has made many experiments in the art of abbreviation, much to his own convenience. The names with which the early locomotives were decorated are now all, or almost all, dropped for numbers, and the names of the trains, which have long been supplemented by numbers, are fast following suit. All the cars—that is all the cars owned by railroads—are numbered, the stations and sidings are all numbered, for convenience in making reports, the telegraph offices are designed by letters, and the names of the railroads are abbreviated to their initials and so are the names of the railroad officers. Indeed on some railroads, in telegraphing, the name of the officer is abbreviated away altogether and the initials of his title are used instead. This must be a convenience on roads whose organizations are frequently changed, as one can always address a telegram to "GS" when information must be given to the General Superintendent, even if you do not happen to remember the name of the person occupying that office. The use of the initials of railroads, which is confusing to the unlearned, has taken a very strong hold not only on the genuine railroader but on the Wall street operator also, and between them they have evolved the grotesque nick names which have been so eagerly seized upon by the passenger department as advertising trade marks. The use of officers' initials in correspondence and conversation has not been so frequently touched upon by the press, as it is more of a local habit in certain railroad families; but the use of the initials has grown to be almost a term of endearment on many railroads, and though some officers are always Mr. So-and-So to their immediate subordinates, yet in other cases the use of initials is considered a perfectly respectful address by a subordinate to his chief. Indeed there is at least one case on record where a railroad officer is addressed by his initials by his wife; although whether this is a case of the use of initials by superior or subordinate we should hardly care to decide.

A few years ago there was presented to the Car Accountants' Association a scheme for further abbreviating the initials of railroads for use on their junction reports, etc., but this proposition, though tentatively accepted, brought to light a very marked strain of conservatism in that body. The Car Accountants were used to saying "B. & O." but when they were asked to go one step further and speak of "BO," they rebelled. They were willing on their junction reports to show cars delivered to the "Big 4," but when it came to "B4," that would not do. This would seem to indicate that there are limits even to abbreviation.

The use of numbers in abbreviations has been carried further than the use of initials. The New York Central classifies the numbers of its locomotives; that is, a certain series is for switchers, another for freight, and a third for passenger engines. Train numbers are classified to a certain extent. As we all know, westbound trains bear odd numbers and eastbound trains even numbers. This should be easy to remember, because, first, the locomotive having been imported from England, train No. 1, which should have represented the first train in America, must have been westbound. On almost all roads the classification is carried farther by the assigning of the lower numbers to the important through express trains, and the higher numbers to local passenger trains and to freights. These lower numbers are sometimes reserved for the main lines, and sometimes duplicated on branch lines, but the custom appears to be growing to reserve certain series of numbers for the trains on certain branch lines, even when it necessitates the numbers running up into the hundreds.

When it comes to cars we find the classification of numbers in many cases carried to such an extreme that with a code to guide you you can tell by the simple car number whether it is built for passenger or freight service and whether it is a box, stock, flat, baggage, express or mail car. Further, under careful supervision, the number may be made to tell the exact standard under which the car is built, which would include its general dimensions and its capacity. All this has been accomplished so far without going beyond five numbers, although, in some cases, a prefix letter has been added, this chiefly in the case of refrigerator cars. With the increase of the equipment in certain railroads and with the combinations of railroads that will doubtless be made in the next few years, it will undoubtedly be necessary soon to use more than five characters, and then it is a question whether it would be better to use an additional figure or a prefix letter. For the figure, it should be stated that in general the Arabic numerals are easier to make and make plainly than the Roman capitals, while, on the other hand, the fact that there are 26 letters in the alphabet as compared to ten Arabic numerals, promises a much larger flexibility for the system which adopts a prefix letter.

In the numbering of stations and sidings we have arrived at the use of prefix and affix letters already, but before entering into details let us begin by deploring the great variety of numbering systems which is now



Sections of Suez and Nicaragua Canals.

Note: The mean depth of the Nicaragua Canal is 14 ft.—not 14 ft. 5 in. as shown here. The maximum depth is about 330 ft.

Sections.	Depth in feet.	Surface width in feet.	Bottom width in feet.	Area of prism in square feet.	Ratio of canal sections to ship section.
Suez, Original dimensions.	27.9	351	72.2	5,904	5.851
" Enlarged	31.2	420	108.2	8,240	8.166
Nicaragua, Rock cut.	30.0	80	80.0	2,400	2.378
" Earth section.	30.0	184	80.0	3,960	3.924
"	28.0	288	120.0	5,712	5.661

notice the complementary effect to that of accumulation in advance of the vessel, it is subsidence of water astern. It being known that the excavated water is sent on in advance of the vessel, it becomes plain that the channel out of which this water has been taken must have its height lowered by the subsidence of the water into the vacant channel out of which the ship has been drawn."

We quote also from some other writers: "The area of the cross section of the canal (Suez) is 3,956 sq. ft.; this is too small for vessels with a displacement of 654 sq. ft., and is the reason for running many vessels ashore (from 1870 to 1888, 11 per cent. of all vessels went into the shore). These stranded vessels are pulled off by three powerful steam tugs, at the expense of the canal company; this work usually consumes five hours." (See *Engineering News*, Sept. 26, 1885, page 195.) Mr. F. R. Condon stated before a Canal Committee of the House of Commons, June 23, 1888: "The Suez Canal, which ought to take the traffic of the world, is positively choked with 10 ships a day." (See page 27 of the report.) Mr. W. W. Evans states: "Another point is the difficulty in traversing curves with these long steamers; it is impossible to keep them from running into the banks, even when on straight lines, as many of them are very cranky. On coming through the Suez Canal in 1879 in one of the P. & O. steamers, 450 ft. long, we had run

one of the large California clipper ships loaded with wheat through this canal, and what will be the cost of towing her?"

All these very important matters which we have stated and briefly discussed are presented to the careful consideration of Congress before it involves this country in an expenditure of \$100,000,000, with another sum of the same or greater size to follow. Especially is careful consideration required now, for the bill recently reported to the Senate by the Committee on Foreign Relations requires that there shall be engraved on the bonds the following words: "The United States of America guarantees to the lawful holder of this bond the payment by the Maritime Canal Co. of Nicaragua of the principal of said bonds and the interest accruing thereon, and as it accrues."

That an interoceanic route for commerce should be opened no one denies, but may it not be pertinently asked: Would it not be well to make haste slowly in this matter and, while considering it, to send to Nicaragua a government commission of experienced and capable

in force on some of our large railroads. There are certain cases where the same little station is loaded down with one number by the freight department, a second number by the passenger department, and a third by the transportation department; and it is quite possible that on some roads the accounting department may give a fourth number to the same point. Of course at large stations, where separate clerks can be detailed to look after the freight business and the other departments, the multitude of numbers may make no great difference, but at places where the agent has to do all his own clerical work this must lead to confusion, and we have always thought it specially hard in the case of the passenger conductor, who has to make up his report to the car accountant with one set of numbers and his report of tickets and passengers with another set of numbers. It is probably too much to expect any official important enough to handle both the traffic and transportation departments to condescend to such a small detail as the numbering of stations, but if this could be accomplished, it would save the poor conductors and agents a great deal of trouble. And it would save a good deal on bills for printing as well, for when there are three sets of numbers there must be three printed lists of stations where one list would do as well if not better.

On most railroads the first attempt at numbering stations has been to begin at one end of the line and number the stations, 1, 2, 3, etc., in regular order. After this has been successfully accomplished and a new station is established at some point not provided with a number, say between 24 and 25, it is then necessary to find a new number for this station. In some cases the official assigning the numbers has added a fraction, so that the new station is numbered $24\frac{1}{2}$ and if a new station is put in between 24 and $24\frac{1}{2}$ he is reduced to the necessity of calling this station $24\frac{1}{4}$, using, it is to be noted, four characters, two of which must be of half the size of the others. The more general plan is, however, in such cases to assign a suffix letter and call the new station 24A. The next step is usually to renumber the road, leaving gaps between the numbers for possible additions, but there are very few men in an office who can predict where stations will be put in along the road, so that this system has usually been found unsatisfactory, and on many roads these plans have been abandoned and the mileage distance from the terminal has been adopted as the number of the station. Thus station 15 would be whatever station is 15 miles from the terminal. This is especially prevalent in car accountants' offices, where the number of miles run by the car is counted from these abbreviations, and the convenience of having the abbreviation represent the distance from the terminal is obvious. Here, again, comes the difficulty that there may be two stations within one mile of each other and this has been met, as before, either by the addition of fractions, which are not desirable because they are hard to make and indistinct after being made, or by the use of suffix letters which need not be so objectionable as under the older systems. Some railroads, however have partially avoided the use of suffix letters by recognizing the fact that more than one station may be in charge of one agent and using the numbers to distinguish the jurisdiction of the agent instead of the actual siding. As many agents, cover a lineal distance of more than one mile this necessitates the use of very few suffix letters. On some lines the suffix letter M is always used to designate mines and on coal roads would seem to be of decided convenience in tracing. So far we have spoken of only main lines.

The first systems of numbering did not attempt to show by the number the branch upon which the station was situated, but the sidings on the branches were numbered as was found convenient. Experiments in the line of locating the point by means of the number have, however, been tried with success. In some cases the branch line is shown by the first figure of the number and in other cases it is shown by the prefix letter. Of course the use of the prefix letter is preferable on large systems, as this provides for 26 branches, while the attaching of significance to the first digit of the number only provides for 10 branches. When it comes to branches of branches the question is more complicated, but on one system at least this has been met by doubling the prefix letters. Under this system a simple number, such as 200 indicates a station on the main line 200 miles from the originating point, a number like T10 would indicate a point on the "T" branch 10 miles from the junction point, and a number such as TS15 would indicate a point on the "S" branch of the "T" branch 15 miles from some recognized junction point. It is hard to see how abbreviations can go further than this.

It is interesting in view of the present tendency toward the use of numerals and initials in abbreviation to note that the Pullman Palace Car Co. still names its cars, and has discontinued the use of numbers altogether. Up to a comparatively recent date many of this company's cars had numbers as well as names, but the numbers are rapidly diminishing. It is possible that a passenger in a Pullman car can remember the name "Tryfosa" more easily than he can 316—if that were the number on the car—and it is possible that when a telegram is "bulled" it is easier to decipher a name than a number, but with the outlandish names which the Pullman Company is now choosing for its cars, it really

seems as if the ordinary conductor would have more difficulty in getting the name right than he would in getting the number right. Moreover, we have grave fears for the interest of literature, history and society, for Pullman cars are built faster than appropriate, euphonious names, historically correct, socially interesting and aristocratically satisfactory can be discovered. The invention of new names will have to be begun before long, and then the whole country will be overrun with cars spreading Chicago standards of art and literature.

The "Manufacturers' Railway Company," of St. Louis, which claims to own 1,000 freight cars, and is supposed to own a railroad several hundred feet long, has sent out a request for annual passes, which, according to the *Pathfinder Guide*, contains the names of a President, First Vice-President, Second Vice-President, Traffic Manager, two traveling auditors, car tracer and eight general agents. This equals one pass to each 67 cars. The names of these officers strongly suggest that their business is making (or drinking) beer. The *Pathfinder* also prints a circular from the New York Central, Hudson River & Fort Orange Road, from which it appears that the President, the General Manager and the Traveling Agent of that road, which is over 3,000 ft. long, will be glad to give annual passes in exchange for similar courtesies. It does not appear what or how many roads receive these modest and polite invitations, but we venture to say that they come only to roads which reach either an important business centre or a pleasant summer resort. To give all roads an equal show would be a great waste of pasteboard. And yet it is palpably unjust, not to say cruel, for these selfish provincials to offer their favors to the officers of big roads, well able to pay their fare, and take no notice of the Sebasticook & Moosehead, the Owensboro, Falls of Rough, etc., and other companies, with which, for real merit, these upstart side tracks are not to be compared. As set forth from time to time in the *Pathfinder*, this matter has a very funny aspect, and every one appreciates such nice little morsels of light reading; but the St. Louis brewery and the Fort Orange paper mill both have large dealings, of a legitimate character, with the railroads; and the documents, on second thought, do not seem to be so entirely fraudulent after all. Very likely some freight agent who desired to make a secret reduction in rates in order to get some shipments of beer was the first to suggest to the brewery this simple way of accomplishing the object indirectly; and some people will wonder how many traffic solicitors won't decline to take advantage of this easy method of favoring a large shipper if the opportunity offered. We fear that the greater burden of fraud rests upon the railroad companies, after all, in some cases.

A very good quality of justice was dealt out by the Supreme Court of Virginia in the case reported in the 13th paragraph of our Railroad Law column to-day. It is amazing how a fog can be changed from light to heavy or heavy to light according as a lawyer desires to convince a jury that white is black or black is white. Those who present these admittedly fallacious arguments, for the sake of impressing the jurymen, must feel ashamed of themselves when they see the judge's clear statement of their true value. In this case the fog argument was probably presented before the other side brought out the facts about the slow order. It is quite likely that this was an instance of the value of the Standard Code of train rules. The rule quoted is very clearly worded and doubtless an effective bit of evidence; whereas a clumsy phrase—and this rule used to be almost universally framed in clumsy terms or else was neglected altogether—would have been likely to influence the court as well as the jury against the road. An engineer's suit also received eminently fair though seemingly severe treatment in the Pennsylvania Supreme Court (the 17th case). In this case the company was undoubtedly chargeable with some blame, but the engineer who fell asleep on his engine was justly forbidden to throw upon the company any part of the burden which the result placed upon him. The road had to bear the money loss and therefore did not get off unpunished. Both sides neglected duty and both suffered.

The very small minority of left-handed railroads in the United States has been reduced by the desertion of the Illinois Central, which went over to the majority the first of the year. It is said that one argument for retaining the left-hand system has been that most of the suburban stations on the Illinois Central near Chicago are west of the tracks. But it appears that with the increasing number of new stations and the approach of the time when over and under passages must be provided at both old and new stations, it was deemed best to take the bull by the horns. In placing the elevated tracks near the World's Fair Grounds room enough has been left between the suburban tracks, for platforms, and steps leading from the intermediate platforms to the depressed streets at the crossings have been provided. The change will favor the Cleveland, Cincinnati, Chicago & St. Louis and the Michigan Central, whose trains have heretofore had to change from the right-hand system to the left-hand on entering the Illinois Central tracks. At present but one track remains at the old level between Forty-seventh and Seventy-first streets, and this is used by outbound suburban trains.

NEW PUBLICATIONS.

Buildings and Structures of American Railroads. By Walter G. Berg, C. E., Principal Assistant Engineer, Lehigh Valley Railroad. 500 pages, quarto, with many illustrations and index. New York: John Wiley & Sons, 1893. \$7.50.

In 1890 and 1891 there appeared in the *Railroad Gazette* a series of papers by Mr. Berg under the title of "Buildings and Structures of American Railroads," and it was announced that they were advance material from a book to be published later. Those articles were abridgements of, or extracts from, the first 16 chapters of the volume which now appears, and to our readers they will already have given an excellent notion of the character and plan of the book. Even those chapters, however, are much fuller in their final shape than as they were presented in the *Railroad Gazette*, and many others are added, there being in all 22 chapters, besides 30 pages of specifications. Over 500 different buildings and structures are described, shown in the illustrations or referred to, and there are nearly 700 illustrations in the text. The descriptions cover all railroad structures above the track level; that is, they cover everything but bridges, culverts, cattle guards and highway crossings, even including ash pits. Special chapters are given to such relatively unimportant structures as watchman's shanties and section tool-houses, and the subjects range from these up to terminal passenger depots, this last chapter being the longest in the book. The buildings treated are shown and described in much detail, dimensions and quantities of materials being given in most cases, and the cost wherever it was practicable.

Mr. Berg's scheme has not been merely to compile, which he has done with admirable discretion and industry, but also to develop the theory or philosophy of each class of structures as he has taken them up, and to state the conditions governing variations of type. Consequently, there is not only description, but a good deal of discussion in the volume; and while doubtless many of Mr. Berg's readers will not agree with him in all of his theories, but they will respect his courage in stating what he thinks, and they will often be stimulated to inject a little more theory into their own designs. Altogether the volume is not only a monument of industry, but an epitome of the experience and acquired knowledge of years of practice.

World's Fair Electrical Engineering.—The first number of this magazine has appeared, and gives excellent promise for future issues. The size of the trimmed page is 6 in. x 9 in., and there are 56 pages of reading matter. The leading articles in this issue are as follows: The Underground Work; The Power Plant; The Electricity Building; The Electrical Exhibits, and Alternating Current Apparatus. In addition to these there are several short articles on various topics connected with the Exposition; a brief review of some of the leading articles in the electrical journals; a synoptical index of current electrical literature; new publications; and electrical patents. The magazine is well illustrated, and is printed on excellent paper. We trust that Mr. De Land will meet with the success to which his excellent work in the field of electrical journalism entitles him.

TRADE CATALOGUES.

Calendars are the resort at this time of the year of two classes of tradesmen, the progressive and the conservative. The latter appear to like a calendar because it does not require the expenditure of much brain power to get up a business card in that form, and the former regard this as the best means of showing their originality. Besides being the beginning of a new year, the present season demands a special reference to Columbus, of course. The prettiest novelty we have received in this line is the calendar of the varnish manufacturers Valentine & Co. Their calendar, which is for the whole year, is printed on a celluloid sheet which is sewed to the outside of a leather pocket book or card case. The Columbian features of this souvenir are neat and historically instructive. The Ajax Metal Co. also makes use of celluloid, sending out a calendar of the "perpetual" style. We admire its beauty, but we are prejudiced in favor of the old-fashioned arrangement of the days of the week, and therefore shall place this on a parlor table or in some other place where it will not be used. The Falls Hollow Staybolt Co. sends out a lithograph of an English girl, with a French headdress, done by a German artist. The Marion Steam Shovel Co. has drawn upon all the colors of the rainbow, and at the same time evinces a practical mind by placing an illustrated advertisement between each two month-pages. The full-page illustrations show the company's steam shovels, ballast unloaders, etc., in an effective and picturesque manner. We must remind the author of this document, however, that the flagman who is ostensibly protecting the gravel train at work on the main track has not gone out far enough to make his flagging worth much. No doubt the artist will justify himself by the claim that this picture was taken from life. This we can readily admit, but an advertisement of this kind is not bound to be true to real life. It ought rather to set forth the ideal perfection. The Butler Draw Bar Attachment Co.'s calendar is an example of high art, whether of Omaha or Santa Fe we are unable to decide. It starts off in January with a portrait of Columbus, which is not only austere but indicative of an inexpressibly

tired feeling. But austerity is thrown to the winds in February, when "America," or something else, is symbolized by a plump and irritable looking Indian woman with a very red skin. In May the incarnation of Chicago appears, and in June that of some other lake city. The young women who represent those towns seem to have no points of symbolical value but amplitude of person and unabashed visages.

The Consolidated Car Heating Co. is issuing a complete set of new catalogues of the various systems of heating they manufacture. Part II. relates to the Sewall coupler, Part III. to the improved McElroy Commingler, and Part IV. to the Multiple Circuit System. The various parts are clearly illustrated and explained, and the quantities and kinds required for each car are set forth with great precision and detail. The catalogues are well printed on good paper.

The Lansing Wheelbarrow Co., of Lansing, Mich., issue a very useful and complete catalogue, giving illustrations, sizes, weight, leading dimensions, price and code name for ordering from a distance. Particulars are given of a great variety of hand-carts, water-barrel carts, push carts, barrel trucks (on castors), warehouse, railroad and steamboat trucks, the Reynolds improved baggage and depot trucks, and many forms of hand trucks for special purposes. Several patterns of baggage barrows are shown, and no less than 32 different wheelbarrows are illustrated and particulars given of their special adaptability to various uses. Various forms of wheels, steel, rubber tired, cast iron, flanged, wooden, etc., are shown with a variety of miscellaneous articles, snow shovels, flexible field rollers, etc. Altogether the catalogue will be found useful to any one interested in appliances of this sort specially designed to be suitable or a particular class of work.

Railroad Building in 1892.

(Continued from page 27.)

Pennsylvania.	
Pennsylvania & Northwestern.—Branch from Horatio north to Fordham.	3.7
Perry County.—New Bloomfield southwest to near Landsburg and Loxville.	8.
Philadelphia Belt Line.—In Philadelphia.	2.6
Philadelphia & Reading.—On Tamaqua, Hazleton & Northern completing line, 4 miles; on Chester & Delaware River road, 1 mile; on Bloomsburg Belt, 2 miles; total.	7.
Pittsburgh & Lake Erie.—On Thompson's Run Coal branch, Ellwood Junction to Coal Mines.	3.5
Pittsburgh, Shenango & Lake Erie.—Lexington to near Conneaut Harbor.	7.2
Sugar Run.—Crystal to North Branch.	10.
Susquehanna.—Castello to Hulls.	14.
Tionesta Valley.—Parish to Hilltop.	3.
Tuscarora Valley.—From Port Royal, southwest to East Waterford.	18.
Western Maryland.—Porters to near Menzies Mill.	3.
Wilkes Barre & Eastern.—Pocono westward.	2.
Williams Valley.—Tower City to Lykens.	7.
Track laid.	307.
Ohio.	
Cleveland, Canton & Southern.—On Cleveland Belt & Terminal at Cleveland.	7.
Dayton, Lebanon & Cincinnati.—Centerville south to Dodds.	6.
Eastern Ohio.—Morgan Junction to Campbells.	1.
Findlay Belt.—On belt line at Findlay.	5.3
Findlay, Fort Wayne & Western.—End of track at Mackinaw, west.	11.7
Middletown & Cincinnati at Middletown.	2.
Pennsylvania.—On Toledo, Watling Valley & Ohio.	52.
Coshocton to Loudonville 46 miles, and on Pittsburgh Ohio Valley & Cincinnati end of track near Pultney Bottom along Ohio River to Powhatan, 6 miles, a total of.	52.
Pittsburgh, Shenango & Lake Erie.—From Pennsylvania state line on branch from Lexington, Pa., to Conneaut Harbor.	5.
Salem.—From Salem to Washingtonville.	7.
Sandusky & Columbus Short Line.—End of track at Bellevue, near Sandusky south to Columbus.	97.
Wabash.—On Chicago and Detroit extension, from near Montpelier west to Indiana state line.	8.7
Track laid.	202.7
Indiana.	
Bedford Belt.—At Bedford and to limestone quarries.	11.
Chicago & South Bend.—To factories at South Bend.	4.
Goshen Lateral.—From Lake Shore track at Goshen.	1.5
Wabash.—On Chicago and Detroit extension, from State line near Montpelier, O., west to near Hammond.	139.4
Track laid.	155.9
Illinois.	
Calumet & Blue Island.	1.6
Illinois Central.—Kensington to Blue Island.	4.
Jacksonville & South Eastern.—Dorley to Greenville.	4.
La Salle & Bureau County.—Between La Salle and Ladd.	7.
Northern Pacific, on Chicago Central.—Ogden Ave., Chicago to Blue Island, 15 miles; on Chicago & Northern Pacific, Blue Island to Harvey, 3 miles; a total of.	18.1
Pawnee.—From end of track laid in 1891 near Pawnee Junction to Auburn.	4.
Peoria Terminal.—From Bartlett toward Peoria.	1.3
St. Louis, Chicago & St. Paul.—Bates to Springfield.	13.
St. Louis & Eastern.—Near Marion.	1.
St. Louis Merchants' Bridge & Terminal, east end of terminal system at Madison to Kinder.	2.
Wabash, Chester & Western.—On Tamaroa & Mt. Vernon, from Tamaroa to Mt. Vernon.	22.
Track laid.	81.
Michigan.	
Au Sable & Northwestern.—McKinley, west along Au Sable River to Twin Lakes.	33.
Chicago, Milwaukee & St. Paul.—On Milwaukee & Northern, from Channing to Sidway in the Northern Peninsula.	47.
Chicago & West Michigan.—On Traverse City extension from end of track laid in 1891 at Sancer Creek, now Alder Station, northwest to Charlevoix, 38 miles, and branch from Charlevoix to Ironton, 4.3 miles; total.	42.9
Flint & Pere Marquette.—From Baube Creek to Union Depot, Detroit, 3.4 miles; on Port Austin Branch to Grandstone City, 1.8 miles; total.	7.2
Iron Range & Huron Bay.—Huron Bay south to Champion.	35.
Manistee & Grand Rapids.—Near Manistee to Chic. & W. Mich. and to Manistee & North Eastern R. R.	6.1

Manistee & N. E.—End of track laid in 1891 near Cedar River, north to Traverse City, 15 miles; and on branches, 3 miles; total.	
Michigan Central.—On Grayling, Twin Lakes & Northern, end of track to Lewiston.	6.
Milwaukee, Lake Shore & Western.—On extension of Ontonagon River branch.	5.7
Track laid.	200.9
Wisconsin.	
Ahnapee & Western.—Casco Junction to Ahnapee.	14.
Chippewa River & Menomonic.—From end of track, Sec. 30-36-8 W., to Deer Lake.	5.
Duluth, South Shore & Atlantic.—Ruthmore, near Iron River, west to Atlantic Junction, near Superior.	41.3
Duluth & Winnipeg.—On Superior Belt Line & Terminal.—From St. Louis to Allouez Bay, in Superior.	12.
Goodyear, Neillsville & Northern.—McKenna to Williston.	12.
Keweenaw, Green Bay & Western.—From West Keweenaw to the lake shore.	2.
Minneapolis, St. Paul & Sault Ste. Marie.—Armstrong north.	3.
Minnesota & Wisconsin.—Woodville north to Emerald.	16.
Track laid.	105.3
SOUTHERN STATES, EAST OF MISSISSIPPI.	
Maryland.	
Baltimore & Ohio.—On Metropolitan Southern—Linden to Chevy Chase Station.	2.
Lancaster, Oxford & Southern.—Childs Station north to Western Maryland, on Potomac Valley R. R., near Williamsport west to Potomac River at W. V. state line.	14.
Track laid.	20.5
Virginia.	
Buckingham.—Arvon to Mitchells.	12.
Norfolk & Western.—On Kingston Branch, 3.6 miles; on Durham Division connection at Lynchburg, 1.3 miles; and on various short branches, 10.1 miles; total.	15.
Track laid.	27.
West Virginia.	
Baltimore & Ohio.—Morgantown north to the State line, near Point Manon, Pa.	6.
Cairo & Kanawha Valley.—Near Cairo, toward Hughes River.	2.
Charleston, Clendenin & Sutton.—Charleston to Clay County line.	15.5
Fairmont Belt.—From Monongahela Junction, with B. & O. R. R.	8.
Huntington & Big Sandy.—Guyandotte to Tenth st., Huntington, 3.1 miles, and Vinson to Kenova, 3.1 miles; a total of.	6.5
Norfolk & Western, on Ohio & West Virginia extension between Dunlow and Kenova, on main line 113 miles, Kenova belt line, 1 mile, and on North Fork Branch, 1 mile; a total of.	115.
Ohio River.—From Guyandotte to east line of Huntington.	3.7
Western Maryland.—On Potomac Valley, end of track at Potomac River west to Cherry Run.	1.
West Virginia & Pittsburgh.—From Elk River Bridge south to Camden on Gauley, 34 miles; from Newton south to Pickens, 10 miles; total.	44.
Track laid.	191.3
North Carolina.	
Atlantic Coast Line System.—End of track near Fayetteville to Rowland, 15 miles, and A. & R. Junc. east to Washington, 25 miles, a total of.	40.
Hoffman & Troy.—From Hoffman to Winona.	3.3
Wilmington, Onslow & East Carolina.—Near Jacksonville toward Maysville.	1.
Track laid.	44.3
South Carolina.	
Atlantic Coast Line System.—On Florence road, Latta north to Dunbar.	17.7
Branchville & Bowman.—End of track to Bowman.	2.
Charleston & Savannah.—Ashley Junction to Phosphate Mines.	5.
Charleston, Sumter & Northern.—From Bennettsville, S. C., north to Gibson Station at North Carolina State Line.	11.5
Track laid.	36.2
Georgia.	
Boston & Albany (Ga.).—From Hollis north to Dot.	10.5
Chickamauga & Durham.—From Chickamauga to Durham.	18.
Georgia, Carolina & Northern.—Bryan west to Atlanta city line, 21.6 miles; on Seaboard Air Line Belt, at Atlanta, from North Decatur to Wanda 8.1 miles; total.	29.7
Macon, Dublin & Savannah.—Macon & Northern R. R. Junction into city of Macon.	2.
Nashville, Chattanooga & St. Louis.—Emmons to Ore Mines.	1.6
Track laid.	61.3
Florida.	
Arcadia, Gulf Coast & Lakeland.—Braidenton south to Sarasota.	13.
Carrabelle, Tallahassee & Georgia.—North of Tallahassee to Sopchoppy River.	10.
Florida Central & Peninsula.—Turkey Creek to Lighthall Spur.	5.
Florida Midland.—Kissimmee to Lake Kissimmee.	4.
Jacksonville & Mayport.—Arlington to South Jacksonville.	5.
Jacksonville, St. Augustine & Indian River.—Daytona south to Rockledge.	66.4
South Florida.—End of track laid in 1891 near Pemberton Ferry north to Inverness.	20.7
Winnston & Bone Valley.—From end of track south of Winnston to phosphate mines.	10.
Track laid.	134.1
Alabama.	
Gurley's & Paint Rock Valley.—Gurley's up Paint Rock Valley.	5.
Nashville, Chattanooga & St. Louis.—Huntsville south to Hobbs Island, Tennessee River.	15.5
Piedmont.—Piedmont Junction to Rossville.	2.
Savannah, Americus & Montgomery, on Montgomery Terminal.—At Montgomery.	5.
Tredgar Mineral.—City limits to Jacksonville.	1.
Track laid.	24.
Tennessee.	
Bristol Belt.—West of Bristol.	1.
Bristol, Elizabethton & North Carolina.—Bristol south to Elizabethton.	22.
Harriman Coal & Iron.—Harriman to De Armond.	4.4
Louisville & Nashville.—On Clarksville Mineral, Marion to Van Leer.	7.1
Nashville, Chattanooga & St. Louis.—To Bon Air Coal Mines.	1.
Paducah, Tennessee & Alabama.—End of track, near Hol low Rock south to Lexington, connecting with Tennessee Midland, 37.2 miles, and on Tennessee Midland east of Perryville to Tennessee River, 8 mile; total.	38.
Watauga Valley.—South Watauga to Tannery.	1.3
Track laid.	74.8

Kentucky.	
Altamont & Manchester.—Altamont east to Lucill.	3.
Jellico & Birds' Eye Coal & Iron Co.—From Jellico to coal mines in Whitley County.	7.5
Louisville Terminal.—At Louisville.	3.
Newport News & Mississippi Valley.—On Ohio Valley, Gracey southeast to Hopkinsville.	10.
Owensboro Falls of Rough & Green River.—Horse Branch, south to Rough Creek, 7 miles; Fordsville to Adams Fork, 3 miles; Owensboro to a new terminal, 1 mile; total.	11.
Winchester & Beattyville.—From Winchester to Beattyville.	6.
Track laid.	40.5
SOUTHWESTERN STATES.	
Louisiana.	
East Louisiana.—Chinchuba south to Mandeville.	5.
Kansas City, Watkins & Gulf.—Oakdale north to Alexandria.	40.
Louisiana Nickel Plate.—Allen, ale north to Hainesville.	3.
Natchitoches.—Natchitoches north to Red River.	5.
New Orleans & Northwestern.—Bastrop to Collins.	7.
Southern Pacific.—On Iberia & Vermilion, New Iberia, west to Abbeville, 16.3 miles; and completing road into St. Charles, 1.5 miles; total.	17.8
Track laid.	77.8
Arkansas.	
Pine Bluff & Eastern.—Swan Lake to English.	2.5
Prescott & Northwestern.—Arcadia to Centre.	2.
Southern Arkansas.—Near Dry Run in Calhoun County.	5.
Stuttgart & Arkansas River.—Dewitt to Darrell.	7.
Texarkana & Fort Smith.—Ashdown north to Wilton.	16.
Ultima Thule, Arkadelphia & Mississippi.—Dalark to end of track beyond Fairview.	8.
Track laid.	40.5
Missouri.	
Greenfield & Northern.—Mt. Vernon to Aurora.	12.
Kansas City & Independence Air Line.—From main line to Fairmount Park.	5.
Kansas City, Nevada & Fort Smith.—From Hume south to a point west of Nevada.	18.
Kansas City, Osceola & Southern.—Coburg to Knoche Junction.	1.
Kansas City Suburban Belt.—In East Kansas City.	1.5
Missouri, Kansas & Texas.—On Missouri, Kansas & Eastern, Hamburg east along the Missouri River to Cedar City.	110.
Missouri Pacific.—From Webb City to Scotland.	4.3
Missouri Southeastern.—Zeta to Aquilla.	3.
St. Louis & Hannibal.—On St. Louis, Hannibal & Kansas City, from a point south of New London to Perry, 18 miles, and between Hannibal and Oakwood, 3 miles; a total of.	21.
St. Louis, Keokuk & Northwestern.—Culvre Junction, toward bridge over Missouri River, under construction at Bellefontaine Bluffs.	25.
St. Louis Merchants' Bridge Terminal.—In St. Louis.	1.2
Williamsville, Greenville & Northern.—Edwards to Greenville.	1.
Track laid.	199.
Texas.	
Chicago, Rock Island & Pacific.—On Southwestern extension, end of track at Red River south to Bowie.	24.
Hearne & Brazos Valley.—Mumford to Stone City.	8.
Houston & Texas Central, on Austin & Northwestern.—Fairland west to Liano.	29.4
Missouri, Kansas & Texas.—Smithville, on main line, west to Lockhart, 36 miles; Boggy Tank east to end of track, near Houston, 57 miles; total.	93.
North Galveston, Houston & Kansas City.—Between Virginia Point and North Galveston.	9.
Pan American.—Victoria south to Guadalupe River.	10.
South Galveston & Gulf Shore.—City limits of Galveston to South Galveston.	17.
Texas, Louisiana & Eastern.—From end of track east of Conroe toward Cleveland.	17.
Velasco Terminal.—End of track laid in 1891 near Velasco north to Chenango, 9.2 miles, and Velasco to Surf Side, 3.5 miles, a total of.	12.7
Track laid.	220.1
Kansas.	
Kansas City, Fort Scott & Memphis.—Weir City to Mackie.	1.
Track laid.	1.
Indian Territory.	
Chicago, Rock Island & Pacific.—On Southwestern Extension, Minco south to Red River.	102.2
Track laid.	102.2
Oklahoma.	
Choctaw Coal & Railway Co.—Oklahoma City to terminus near El Reno.	11.
Track laid.	11.
Colorado.	
Crystal River.—On branch from Coal Creek to Coal Basin.	5.
Union Pacific, on Union Pacific, Denver & Gulf.—Extension of Grey Creek branch to Chappell, 2.57; Victor Junction to Acme Junction, 7.25; Acme Junction to Aquilar, 2.51; near Louisville to Allen Bond mine, 3.22; a total of.	15.4
Track laid.	20.4
New Mexico.	
Atchison, Topeka & Santa Fe.—On Cerrillos Coal & Iron Co.'s road, Waldo to coal fields.	5.8
Track laid.	5.8
Arizona.	
Santa Fe, Prescott & Phoenix.—Ash Fork, on Atlantic & Pacific, south toward Prescott.	19.
Track laid.	19.
Utah.	
Great Salt Lake & Hot Springs.—Stockdale to Simkins.	2.
Rio Grande Western.—Eureka to Mammoth Hollow.	12.7
Salt Lake & Los Angeles.—Salt Lake City to Saltair.	14.
Track laid.	28.7
NORTHWESTERN STATES.	
Iowa.	
Burlington, Cedar Rapids & Northern.—Forest City, west to near Estherville.	31.
Chicago, Ft. Madison & Des Moines.—Libertyville, west to Ottumwa.	21.
Southern Iowa.—Pekay Junction, on Iowa Central, to Pekay.	2.5
Track laid.	54.5
Nebraska.	
Burlington & Missouri River.—Hamlet, west to Imperial.	22.8
Chicago, Rock Island & Pacific.—From Lincoln southwest to Jansen.	53.7
Track laid.	76.5

Minnesota.

Brainerd & Northern Minnesota.—Brainerd, on Mississippi River, north to Gardner.	42.
Burlington, Cedar Rapids & Northern.—North Sioux Falls to Jasper Co.—From Cloquet, north.	3.8
Cloquet Lumber Co.—From Cloquet, north.	8.
Duluth & Iron Range.—Allen Junct. to West Canton mines in Mesaba range, 15.5 miles; Allen Junct. to Chisholm mine, 1 mile; total.	16.5
Duluth, Mesaba & Northern.—Stony Brook to Mountain Iron, 48.6; Iron Junct. to Biwabik Mines, 13 miles; Ore Junct. to Mesaba Mt., 7 miles; total.	71.6
Duluth, Mississippi & Northern.—Mississippi River, near Swan River, northeast.	15.
Duluth, Red Wing & Southern.—Near Clay Bank Station.	3.5
Duluth Transfer.—Between Duluth and Ironton.	5.5
Great Northern.—St. Hilaire to Thief River Falls, 7.5; and St. Hilaire to Red Lake Falls 10.3 miles; a total of.	17.8
Port Arthur, Duluth & Western.—Gunflint Lake, Ont., at State line toward Mesaba range.	6.
Track laid.	189.7

South Dakota.

Dakota, Wyoming & Missouri River.—Rapid City, S. D., to Brown's Crossing.	5.5
Track laid.	5.5

North Dakota.

Minneapolis, St. Paul & Sault Ste. Marie.—Valley City north to Cathay, 80 miles; Merricourt west to Kulm, 12 miles; total.	92.
Track laid.	92.

Wyoming.

Burlington & Missouri River.—Gillette northwest to Sheridan.	101.5
Track laid.	101.5

Montana.

Great Northern.—On Pacific Coast extension, end of track laid in 1891 from Kalispel, Mont., west to Idaho state line.	122.4
Montana Central.—At Butte to Mountain View.	4.9
Track laid.	127.3

Idaho.

Great Northern.—On Pacific Coast extension, State line west of Kalispel, Mont., to state line near Spokane, Wash.	82.7
Track laid.	82.7

PACIFIC STATES.

California.

Arcata & Mad River.—Riverside to Mad River.	2.5
Atchison, Topeka & Santa Fe.—On Southern California, East Highland to Mentone, 2.7 miles; Mesmer northwest to Santa Monica, 5.4 miles; total.	8.1
San Francisco Belt.—Along water front of San Francisco.	1.
San Francisco & North Pacific.—Near Guerneville, west to Russian River.	2.
Southern Pacific.—Redlands Junction to Crafton, 5.6 miles; Colliis to Fresno, 15.2 miles; Bakersfield to Asphalto, 17.4 miles; Santa Monica to New Wharf, 2.4 miles; San Bruno, north to South San Francisco, 2 miles, and Boden to San Francisco, 1 mile; a total of.	76.2
Track laid.	89.8

Oregon.

Coos Bay, Roseburg & Eastern.—End of track at Dunham, south toward Coquille City.	7.5
Portland & Mt. Scott.—Near Mt. Tabor, southeast.	4.
Sumpter Valley.—Near Baker City.	2.
Track laid.	13.5

Washington.

Bellingham Bay & Eastern.—New Whatcom to Lake Whatcom.	3.
Everett & Monte Cristo.—Lowell to S. & M. Junction at Everett, 5 miles; Hartford Junction east toward Monte Cristo to Cañon of Stillaguamish River, 10 miles; total.	15.
Great Northern.—On Pacific extension, from the east boundary of Washington to Everett, on the main line, 340.7; and switchback over the Cascades, 10.2 miles; a total of.	350.9
Northern Pacific.—On Yakima & Pacific Coast, at end of track, west of Chehalis, toward South Bend, 37.5 miles; Aberdeen Junction to Aberdeen, 3 miles; total.	37.8
Oregon Improvement Co.—Columbia & Puget Sound, Maple Valley to Sherwood.	9.5
Shelton Southwestern.—In Mason county.	6.
Spokane Falls & Northern.—Little Dalles, north to Northport, on the Columbia River.	3.7
Washington Southern.	3.5
Track laid.	432.4

CANADA.

New Brunswick.

Tobique Valley.—Red Rapids to Wapkehegan River.	12.
Track laid.	12.

Quebec.

Orford Mountain.—Lawrenceville to Kingsbury.	16.5
Quebec & Lake St. John.—On Chicoutimi Branch from Chambord Junction, east toward Chicoutimi.	30.
Quebec, Montmorency & Charlevoix.—St. Anne's to Grande Riviere.	3.
United Counties.—St. Angèle to St. Hyacinthe.	20.
Track laid.	69.5

Ontario.

Ottawa & Gatineau Valley.—End of track north of Ottawa north to Kazubazua.	15.
Port Arthur, Duluth & Western.—Near Sandy Lake to international boundary line at Gunflint Lake.	10.
Track laid.	25.

Manitoba.

Canadian Pacific.—Deloraine to Napinka, 17.8 miles; Men-teith to Pipestone, 31.5 miles; Nesbitt to Souris, 18.5 miles; total.	67.8
Track laid.	67.8

Northwestern Territories.

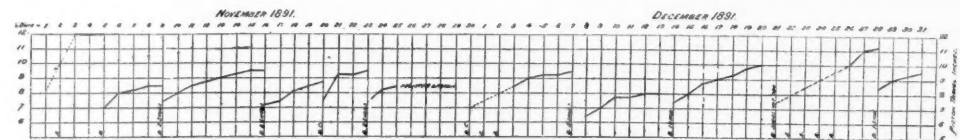
Calgary & Edmonton.—Mosquito Creek south to Macleod, Alberta.	51.
Canadian Pacific.—Oxbow to Estevan, Assin.	38.5
Track laid.	89.5

MEXICO.

Mexican Central.—End of track laid in 1891, west of Tula, to Pachuca.	10.
Mexican International.—Forreon to Durango, 156 miles, and Pedricena to Valeriana, 6 miles; a total of.	162.
Mexican Inter-oceanic.—Matamoros to Chihuahua.	14.3
Mexican Southern.—Tecomoyaca to Oaxaca.	89.
National Tehuantepec.—Track laid on main line.	17.
Peninsula of Lower California.—San Quintin, northward.	17.5
Track laid.	309.8

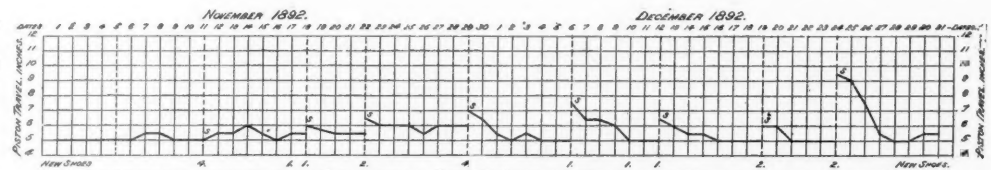
Automatic Versus Hand Adjustment of Slack in Brake Rigging.

Some time ago we published graphical records of air brake piston travel with automatic and hand adjustment, respectively. The latter is again shown, for comparison with a later record of automatic adjustment covering the months of November and December, 1892, which is also given. The records were made on cars of regular passenger trains on the Trenton branch of the Philadelphia & Reading. These cars make 24 round trips of 7½ miles each per 24 hours, there being eight stations between terminals. One Hinckley adjuster was used, placed in the fulcrum rod beside the brake cylinder. A piston register was attached to the car, and the reading taken daily at noon, and the slide then knocked back; in this way the exact variation of stroke from day to day was obtained. The adjuster was set for a piston travel of 5 to 6 in. It was operated by hand only, by the inspector, when putting in new shoes. This occurred on Nov. 18, 22 and 29 and Dec. 6, 12, 19 and 24. In each case the slack thus given was left for the adjuster to subsequently correct. Nineteen new shoes were put in in 61 days; the stroke of piston did not exceed 6 in. or go below 5 in. during 56 days of this time. The days upon which the record shows over 6 in. were due to the slackening off by inspector to put in new shoes, as indicated upon the diagram by letter S.



Record of Piston Travel—Hand Adjustment.

A, reading not observed; B, slack adjusted by hand; C, register slide set back.



Record of Piston Travel, with Hinckley Adjuster.

Upon comparing with the hand adjustment record, it will be noticed that lines of variation are exactly reversed. In the former the shortest stroke is immediately after putting in new shoes, which increases on the upward lines more or less abruptly, until an excessive stroke is reached, when slack is again adjusted and stroke again reduced. Whereas, in the automatic record the stroke is practically uniform until slack is given to put in shoes; when, if too much slack is left, the stroke works back upon the downward lines until the prescribed stroke is regained more or less closely.

It will be noticed that on the hand adjustment diagram the stroke was less than 7 in. on one day only of the 61 days; on 26 days it was 9 in. and over. Of these 26 days, on six days the stroke was 11 in. and over. For three days only out of 61 was the stroke 7 in. or less.

TECHNICAL.

Manufacturing and Business.

The suit of William K. Tubman against the Wason Manufacturing Co. for infringement of a patent on bay windows in passenger cars, was decided in the United States Circuit Court, at Boston, Jan. 3, for the defendant—Judge Carpenter delivering the opinion. Tubman's patent was No. 192,014, granted in 1877 to George S. Roberts. The Wason company built cars under B. Price's patent, No. 335,770, issued in 1886. The judge finds that bay windows were patented as far back as 1852, and that the valid portion of Robert's patent was not infringed by Wason. He says: "The bay window of Roberts has a general outline which may be represented by two lines, each oblique to the side of the car and meeting in an obtuse angle; the bay window constructed by the respondents would in like manner be represented by two lines oblique to the side of the car and connected at their outer extremities by a line parallel with the side of the car. This is not the structure of the Roberts patent."

The Railroad Lighting & Manufacturing Co. desire to give notice that Mr. Merle Middleton is not, since Jan. 1, in their employ, and that all communications in reference to the Frost dry carburetor system of car lighting, formerly sent to the Phenix Building, Chicago, should now be addressed to the Monadnock Building, Chicago, or Girard Building, Philadelphia.

Mr. Wallace B. Post, for many years with the Troy Steel & Iron Co., has associated himself with Geo. P. Bullard, under the firm name of Bullard & Post. The new firm has offices in the Telephone Building, Boston, and will act as New England agents for Jones & Laughlins and J. Painter & Sons, of Pittsburgh.

The following companies were incorporated in Illinois last week: Laurel Hill Car & Coal Co., Chicago; capital stock, \$500,000; incorporators, W. P. Rend, Joseph P. Rend, Robert C. Newton;—The Steel Coupler Co., of Chicago; capital stock, \$250,000; incorporators, Lynden A. Seymour, Percy V. Castle and George S. Cole;—Key-stone Car Door & Supply Co., of Chicago; Crittenden A. Cox, William J. Craig and Lewis B. Smyser.

Messrs. Robert Spencer and Carter H. Fitz-Hugh have been appointed representatives of the Baldwin Locomotive Works for the Northwest, with offices at the Monadnock Building, 98 Jackson street, Chicago.

In the uptown power station of the Broadway Cable Road, in New York City, the C. W. Hunt system is used for conveying coal and ashes to and from the boilers, which aggregate 1,500 H. P. The ash cars are run on a sunken track directly under the furnace doors, and are of the latest improved pattern made by the C. W. Hunt Co.

These directors of the Carlisle Manufacturing Co. were elected on Jan. 4 to serve for the ensuing year: J. H. Bosler, S. F. Bowen, John Hays, William R. Line, J. P. Bixler, J. N. Choate, W. F. Horn, John H. Wolf and H. G. Beetem. J. H. Bosler is President and S. F. Bowen, General Manager and Treasurer.

The Q & C Co., of Chicago, has acquired the control of the Standard Cattle Guard, which has been on the market for the past year. As a new device it has had

remarkable success and the approval of the roads where ever it has been used. The Q & C Co. will continue to sell the device as now made, and will also bring out a new cattle guard, which will be called the "Q & C," which will have various improvements.

Booth, Garrett & Blair, of 406 Locust street, Philadelphia, announce that they have established a department in their laboratory for the mechanical testing and inspection of iron, steel and other metals. The class of work that they propose to undertake will include not only rails, structural and bridge material, but also railroad equipment and supplies, water pipe and all similar material, subject to specifications and tests chemical or physical. They have associated with them as a partner F. H. Lewis, favorably known as an expert in this speciality, who will have general charge of this department. They are also adding to their physical laboratory a modern high speed testing machine of 100,000 lbs. capacity.

The National Hollow Brake Beam Co. announces that it has leased its entire business, plant and patents to the Chicago Railway Equipment Co., which company will manufacture and sell the National hollow brake beams and assume the business heretofore carried on, and perform all the contracts and business of the National Hollow Brake Beam Co. as if no change had been made. It will be their earnest endeavor to keep the hollow brake beam up to its present high standard, and hope thus to merit and receive the liberal patronage given their predecessors. They announce that E. B. Leigh has accepted the office of General Manager of the company. Messrs. A. J. Farley and L. C. Burgess will be in charge of the sales in the West, with office No. 514 Phenix Building, Chicago, and F. G. Ely in the East, with office at No. 29 Broadway, New York, as heretofore, and H. B. Robischung, Superintendent at the Works. Neither the National Hollow Brake Beam Co. nor the Chicago Railway Equipment Co. are in any way, directly or indirectly, identified with any other brake beam company.

Iron and Steel.

The steel works of the Colorado Fuel & Steel Co., at Pueblo, Col., is now turning out a much larger quantity of finished products than formerly. The entire plant was recently remodeled by E. C. Potter, formerly Vice-President of the Illinois Steel Co.

New Stations and Shops.

The Pittsburgh & Western has commenced the foundations for a six-stall roundhouse at New Castle Junction, Pa.

Allen B. Rorke, of Philadelphia, has been awarded the contract for erecting the new Spring Garden Street

Station of the Philadelphia & Reading Terminal. The architects were J. A. Wilson & Co., of Philadelphia, and the station is of the same design as the Eighteenth and Twenty-eighth street stations on the Sixth Avenue elevated road in New York City, which were built by the same firm.

The Pennsylvania is to build a new passenger station and trainshed at Lancaster, Pa., as soon as the freight house now being erected is completed.

The Rodger Ballast Car and Plow.

The Rodger Ballast Car Co. has ordered of the Wells & French Co. 534 cars of the improved Rodger type, which are to be distributed as follows: 408 go to the Great Northern line, which already has 208 of these cars; 26 are for the Soo line; and 100 for the Missouri, Kansas & Texas. The Rodger car as originally used in New Zealand was illustrated in the *Railroad Gazette* July 27, 1888. Since that time the construction has been improved in many details, making it conform to American railroad practice in car construction, and enabling it to handle various kinds of ballast more effectively. By the Rodger method the ballast is dropped between the rails from a hopper car, and is distributed by the following car, which carries a plow. This leaves the ballast level between the rails and piled up to a slight extent outside, and leaves the track in suitable condition for trains to pass over it at any speed. This system has been used by the Illinois Central on the work of elevating its tracks in Chicago.

Forged Steel Balls.

The Pittsburgh Steel Casting Co. is now manufacturing cast steel balls in addition to the ordinary business of steel castings. The balls are first cast of crucible steel and are then heated to a forging heat and finished under a one-ton steel hammer provided with hemispherical dies of the size of the ball. The ball casting is hammered and rotated during the hammering by which it is very evenly compressed, all signs of the head and gate obliterated, and a practically perfect spherical ball is the result. After forging, the ball is allowed to cool rapidly so that the surface becomes very hard. During forging the ball is compressed about $\frac{1}{2}$ of its diameter. Dies are provided for all sizes of balls from 2 in. to 9 in. in diameter. The cost of the finished balls is about two cents a pound more than ordinary steel castings. It is said that they are used extensively for crushing purposes for emery, black lead, corundum, etc. and also for ball bearings in turn tables.

New Twin Screw Steamers.

The Norwich & New York Transportation Co. has closed a contract with the Bath Iron Works, of Bath, Me., for a large steel twin-screw passenger steamer for the Norwich line on Long Island Sound. She is to be larger than the largest boat of the line, the "City of Worcester," and is guaranteed to be faster than the "Richard Peck," the new steel twin-screw boat of the New Haven line, which is now the fastest boat on Long Island Sound. The vessel was designed by Cary A. Smith, of New York, who modeled the "Richard Peck."

National Railway Spring Company.

The National Car Spring Co., of New York, and the Oswego Railway Spring Co., limited, of Oswego, N. Y., have consolidated their interests in a new organization to be known as the National Railway Spring Co. This change has been made with a view to reducing the cost of production and minimizing expenses and, at the same time, to improve the quality of the product.

The new company is to build at Buffalo, N. Y., one of the most perfectly equipped spring plants in the United States with machinery and tools of the most approved type. Until this factory is built the present factories of the company at Newark, N. J., and Oswego, N. Y., having a daily capacity of 30 tons of spirals and 10 tons of elliptics, will be used for the execution of orders. The organization of the new company is a very strong one. All of the gentlemen connected with it have the advantage of long experience in the business. Theo. Irwin, the President, and Mr. George B. Sloan, Jr., Secretary and Treasurer, have been connected with the Oswego Spring Co. for a number of years and are well and favorably known to the trade. Mr. Thomas M. Bell, the Vice-President of the company, is one of the best known men in the spring trade. He first entered the spring business in 1880 with the Scott Spring Co., of Philadelphia; resigned in 1889 to become Vice-President of the National Car Spring Co., with which company he has been connected up to the present time. Mr. Edward A. Cliff, the Superintendent of the new company, is one of the oldest spring makers in the country. In 1870 he became Superintendent of the Vose & Dinsmore Spring Co., and in 1874 he retained the same position when the company was reorganized under the name of the National Car Spring Co. In 1880 he resigned to organize and become Superintendent of the Cliff & Righter Co., of Oswego, N. Y. He resigned the latter position in 1887 to again become the Superintendent of the National Car Spring Co., which position he has held up to date. He is the inventor of a good many improvements in car springs and the new company is to have the benefit of these new appliances. The main office of the company will be at Oswego, N. Y., with branch offices at 115 Broadway and 913 Drexel Building, Philadelphia, Pa.

THE SCRAP HEAP.

Notes.

The New York Central has shortened the runs of its freight trains between Buffalo and Syracuse. Hitherto they have run through between these points, 150 miles, but hereafter will turn at Rochester.

The Canadian Pacific was blocked in the Rocky Mountains last week by snow slides which are said to be worse than any that have occurred during the past five years, and the interruption was expected to continue several days.

The shops of the Norfolk & Western at Portsmouth, O., were burned last Sunday, together with several cars. Estimated loss, \$40,000. The Louisville & Nashville lost several cars and sheds by fire at New Orleans, Jan. 6. Estimated loss, \$75,000.

Four freight car thieves have been arrested at Buffalo and it is said that they are connected with the large gang exposed at Erie last week and the week before. It is claimed that a large number of hitherto respectable persons are involved in these wholesale robberies.

The railroad officials [no, the shippers] economize space in their cattle cars. Not long since a train of steers passed over the Lehigh Valley road in which the beasts were packed head and tail, and under each steer was a hog—not built exactly like those who loaded the car, but just an ordinary respectable hog.—*Exchange*.

General Manager A. M. Tucker of the Erie Lines west of Salamanca believes in taking time by the forelock. Hearing that certain employees intended to ask for more pay he has issued a circular reiterating the views expressed by the President of the company in 1890 and stating that the net earnings of the road are no more favorable now than they were then.

The Missouri, Kansas & Texas has won the suit entered in the Kansas Court at Topeka by the Pullman Co. to restrain the road from placing Wagner cars on its lines. As the Missouri, Kansas & Texas will open its St. Louis line in a few months and its Texas main line to Houston, the Wagner service will be complete from the Atlantic seaboard to the Gulf of Mexico, as the Wagner cars are used between St. Louis and New York over the Wabash and Big Four.

It is stated that the number of freight cars hauled over a five mile single track section of the Northern Central during the year 1892 was 550,521; a very large movement and very likely, as claimed, the heaviest ever carried over a single track. The section of road referred to lies between Rockville and Dauphin, Pa., on the Susquehanna division. This traffic was divided as follows: 4,390 engines and 267,271 freight cars westward, and 4,357 engines and 253,250 cars eastward, a total of 8,747 engines and 550,521 cars. These figures include all light engines, but exclude passenger movement. This is equal to about 730 cars each way daily, which, divided by the number of engines, shows that the average train load was something over 60 cars. As some of the engines were empty the actual average length of trains was something larger.

Railroad Matters in Congress.

The amendment to the Interstate Commerce law designed to remedy the defect in the law found by the Supreme Court in the Counselman decision was passed by the Senate last Friday. It provides that no person shall be excused from testifying in any criminal case based upon any violation of the Interstate Commerce act on the ground that his testimony might tend to criminate himself or subject him to penalty or forfeiture. Such person shall not be prosecuted on account of anything which he may testify in any case, but he shall not be exempt from prosecution and punishment for perjury committed in so testifying.

Further amendments to the Interstate Commerce law were proposed in Congress on Jan. 10. The House Committee on Commerce decided to report two bills to amend the Interstate Commerce law so as to meet the Supreme Court decision in the Counselman case, and also Judge Gresham's recent decision. The committee practically adopts the Senate bill, which provides for complete immunity to witnesses testifying in regard to violations of the law. The Gresham decision is met in the way pointed out by the judge in his opinion, by providing a penalty for refusal to obey the summons of the Commission.

A bill creating a department of transportation and providing for the construction of a Nicaragua ship canal has been introduced in the House by Mr. Otis, of Kansas. He proposes that the new department have general supervision of the carrying trade of the entire country, and to exercise all the powers of the Interstate Commerce Commission, which is abolished. On his appointment the Secretary of Transportation is to name a commission to proceed to Central America to inspect the work done by the Maritime Canal Co. and report what treaties, etc., are necessary to give the United States full control of the Nicaragua Canal.

Representative Wise, of Virginia, has introduced in Congress a bill to strengthen the law for the punishment of robbery upon or wrecking of trains. The bill prescribes punishment for these offenses by fines ranging from \$5,000 to \$10,000, imprisonment, and, in case of the killing of a traveler, by the death penalty.

World's Fair Notes.

Germany will send a particularly fine exhibit to the transportation department of the World's Fair. Examples of recent practice in locomotives and cars will be exhibited, and also a large amount of material from the German Associated Engineering Societies and from the Hermann Museum. The extent of the exhibits from the last two sources is limited only by the space available. The exhibits will occupy the full length of the gallery at the southern end of the Transportation Building.

An item was recently published in the *Railroad Gazette* to the effect that Mr. Clement E. Stretton, of England, had sent to the World's Fair a certain collection of old rails, chairs and the like. It is true that Mr.

Stretton has forwarded a very valuable collection of illustrative and more or less historical material, but he has done so as the agent of the Baltimore & Ohio Railroad. He has been for many months a special representative of that company in collecting material in England, and his contribution to the remarkable exhibit which the B. & O. is preparing will undoubtedly add very much to its interest and value.

A circular letter to the General Passenger Agents of the Chicago terminal lines has been sent out by Messrs. O. W. Ruggles and Geo. H. Heafford, chairmen of the committees of the Western Traffic and Western Passenger Associations on arrangement for the establishment of a Bureau of Information at the World's Fair next summer. It is stated that three-fourths of the Chicago rail terminal lines and three of the lake lines are in favor of establishing such a bureau in the Transportation Exhibits Building from May to October inclusive. An invitation is therefore extended to all of the Chicago terminal lines to be represented at a meeting to be held at the Great Northern Hotel, Chicago, Jan. 25, for the purpose of arranging the details for the proper operation of the bureau.

Another Express Train on the New York Elevated.

An express train will be run over the Sixth Avenue line of the Manhattan Elevated, to connect with the New York and Boston night express over the New York & Northern, which leaves from 155th street and Eighth avenue daily at 11:30 p. m. The new train leaves South Ferry at 10:37 p. m.

A Portable Electric Light.

Under the auspices of the Electrical Society of Berlin, experiments have recently been made on the maneuvering grounds at Tempelhof with a portable electric lamp, fed by storage batteries, and specially designed to facilitate the search for wounded soldiers on a battlefield. The lamp was of 50 candle-power, and the storage battery weighed only about 17½ pounds. The light could be kept up for several hours without recharging the battery, and with the aid of a reflector furnished a bright illumination at a distance of 100 metres.

A Family of Roadmasters.

Since the appointment of J. W. Shanks as General Roadmaster of the Central Vermont railroad system, the continuous line of road from New London to North Bay, on the Canadian Pacific, 1,665 miles (except 24 miles between Brattleboro and Bellows Falls, and 28 miles between Ottawa and Brockville), is under the Shanks family. Five brothers are the roadmasters on the Central Vermont and Canadian Pacific roads as follows: James W., of the Central Vermont system, from New London, Conn., to Rouse's Point, N. Y., and St. Johns, P. Q., 520 miles; Gavin, of the Canadian Pacific, from Newport, Vt., Sorel, Megantic and Stanbridge, P. Q., to Montreal, 500 miles; John, from Montreal to Ottawa, 260 miles; William, from Brockville to Chalk River, 165 miles; and Robert from Chalk River to North Bay, 120 miles.

The English Channel Bridge.

The English channel bridge project is again being spoken of in European journals. An exchange says that the preliminary works of the company which is at the back of the undertaking has now been completed, and that the estimated cost of the finally accepted design is placed at about \$160,000,000. There are to be 72 piers, the bridge spans ranging from 400 to 500 metres, and the bridge is to be sufficiently high to enable the largest vessels to pass under it in the roughest weather. Nothing appears to have been yet definitely decided upon as to the character of the approaches to the bridge. The piers are to be built of steel, so as to afford little resisting surface to wind and waves. The whole work of construction is to be completed in seven years. The bridge is to be lighted electrically, and each pier is to carry huge, colored signal lights. We print this not so much for its value as news as to give a ray of hope to American proprietors of bridge works and structural steel mills. They need it.

Numbering Car Seats in Europe.

In an article in a recent issue of the Austrian *Eisenbahn-Zeitung*, a flattering tribute is paid to the Pullman service on the railroads of the United States, special reference being made to the New York and Chicago Limited train of the Pennsylvania, of which a glowing account is given. The special object of the article is to urge a system of numbering seats in European railroad cars, so that a seat can be secured for and retained throughout a journey on something like the plan followed with American sleeping and drawing-room cars. This numbering of seats, however, is not to be reserved to luxurious cars, but is to be carried out with the ordinary coaches. The various advantages of such a system are commented upon at length, and the credit for its inauguration is unqualifiedly given to America.

The University of Chicago.

Instead of the usual annual commencement the University of Chicago is to have four convocations a year, corresponding to four commencements, the basis being that as students are admitted four times a year there will presumably be some to graduate every three months. The first convocation was held in Chicago last week and was the occasion of an admirable address on "The Need of Universities in the United States," by Prof. von Holst. A brief outline of some of the facts presented by President Harper in his address is not without interest. A year ago the foundation of the first building had just been placed, and only two buildings had at that time been provided for, a dormitory and a lecture hall. At that time the funds included the first large gift of Mr. Rockefeller, \$600,000; the \$400,000 of general subscription; the gift of land by Mr. Field; Mr. Rockefeller's second gift of \$1,000,000, and the property and endowment coming to the University by its union with the Theological Seminary—in all about \$3,000,000. A year ago only two men had received appointments in the faculty and entered upon their work, and in all not 10 men had indicated their consent to serve the University as instructors. At present the dormitory for men has been completed and every room is occupied. The lecture hall is finished and crowded to overflowing. Temporary buildings have been erected for the library and gymnasium, and a chemical laboratory is almost ready for the roof; a museum is under way; temporary buildings for women are rapidly approaching completion, and a new dormitory for men is under roof. Within the month buildings to cost at least one and one-half millions will be completed. Within the year gifts have been made exceeding \$4,000,000.

Instead of the two men of a year ago, there are to-day 120 at work, and in estimating this number it should be

remembered that no faculties of law and medicine have yet been organized, and that no provisions have yet been made for technical work. The total enrollment of students has been 594, of which 186 are doing post-graduate work; 152 are in the divinity school, and 276 are doing undergraduate work. In the University Extension division three departments of work have been fully organized. In the lecture study department there are 53 lecturers; 117 courses are offered, 40 centres have been organized, 52 courses have been given, and the number of students in attendance is 12,578. In the correspondence department 60 courses of instruction are now offered. In the class work department a total of 57 courses are offered.

Signalmen's Hours in England.

In consequence of the Board of Trade report on the Thirk's accident, the Midland Railway (England) has issued new regulations limiting the hours of signalmen in all cases to twelve consecutively. Hitherto 13 hours has been recognized as the limit for night men and 11 for day men. In future the uniform time will be from 6 to 6. There has also been a rearrangement of Sunday duty where stations are not open. When signalmen change, the outgoing official will be held responsible if the relief man is not in a condition to work.

More Cable Roads for New York City.

The completion of the cable roads on Broadway and Third avenue, New York, will probably see work of a similar character in active progress on two other streets. The franchise for the building of the Ninth avenue extension was sold to the Columbus & Ninth avenue Railroad Co., of which Anthony N. Brady is President. The terms of the sales were the payment to the city of one-fourth of one per cent. of the gross receipts over and above the statutory requirements, which are three per cent. of the same for the first five years and five per cent. thereafter. The extension will follow Ninth and Columbus avenues, to 110th street, with branches through 108th street to Amsterdam avenue, and also through Fifty-third street to connect with the Broadway road. While this is being done the present Ninth avenue surface line will be changed to a cable road.

The sale of the Lexington avenue road was postponed for one week in order to settle the question of injunctions which were applied for both by the residents of the avenue and Third Avenue Railroad Co., whose most powerful rival the new road will be. The injunction against the sale having been denied, it took place on the 6th inst. The franchise was bought by President Anthony N. Brady, of the Lexington Avenue and Pavyon Ferry Railroad Co., who offered the city one-half of one per cent. of the gross receipts over and above the statutory requirements, and at once complied with the other conditions of the sale.

This will bring both roads into the great street railroad syndicate which has built the Broadway road and has now extensive control in New York, Philadelphia and other Eastern cities.

The proposed road is to run on Lexington avenue from Forty-second street, where connection is made with the Houston, West Street, and Pavyon Ferry road, to Ninety-eighth street, and on the opening of Lexington avenue beyond that point, to the Harlem River, with a branch through 110th street to Morningside Park.

The Metropolitan Traction Co. is the name of the organization under which the above-mentioned syndicate controls its New York lines. Eleven of the principal longitudinal and transverse roads have been acquired by it. Its plans include the building of more direct "feeders" from the ferries to the great longitudinal lines and a transfer system which will enable a passenger to reach any part of the Metropolis on one fare.

Old Tickets Wanted for the World's Fair.

It will be remembered that the Department of Transportation Exhibits of the World's Columbian Exposition some months ago appointed Mr. Geo. DeHaven (General Passenger Agent of the C. & W. M. and D. L. & N. roads) to make a representative collection of railroad and steamship tickets and passes. It is desired especially to secure, by gift or loan, such tickets, time tables, maps, etc., as have a special historical value. Large numbers of these are doubtless in existence in the hands of collectors or of those men or their descendants who were identified with the railroad or steamship business during the first half of the present century. It is hoped that this paragraph may reach the attention of many such, and that they will at once communicate with Mr. DeHaven on the subject. Suitable acknowledgment will be made and the best of care given to such loans. Information as to the existence of such relics and to whom to apply for them will also be gratefully received. Mr. DeHaven's address is Grand Rapids, Mich.

Railroad Laws in Minnesota.

Governor Nelson, of Minnesota, makes, in his message to the legislature, a summary of the Railroad Commissioners' report, in which he refers to their recommendations as follows:

The Board has pointed out the desirability of making some changes in our present law, so as to have it conform as far as possible with the Interstate law governing railroads throughout the national dominion. They have renewed recommendations of various kinds made in their reports in the past, and I beg to especially invite your consideration of those sections which call attention to the desirability of enacting laws relative to the issuance of passes for the free transportation of passengers. This discrimination should be done away with at the earliest possible moment. The law should be amended so as to permit the Commission to inquire of its own motion into the rates and practices of any of the railroads without being compelled to wait until some formal complaint is made. It is gratifying to state that the sections of the law requiring that cars shall be furnished to individual shippers have been carried into effect very generally during the last two years. The transportation companies as a rule have manifested a desire to comply with the spirit of the law in this respect. The most important work entrusted to the board of railroad and warehouse commissioners is the inspection and weighing of grain. During the past year, with one or two exceptions, the elevators at the terminal points have become private warehouses and are not amenable to the laws of the State. The question of the inspection and weighing of wheat at points outside of the large cities is a most vexatious one, and is a problem most difficult of solution. There is every reason to believe that at country points there has been much discrimination in the way of dockage and in grading wheat. The board has arrived at the conclusion that it will be well to place all warehouses at country points within the supervision of the commission. I am inclined to the opinion that this is the best plan that has been presented.

'Cute Enough to Be True.

SPECIAL TO THE SAN FRANCISCO MORNING CALL.—COST OF TELEGRAPHING NOT STATED.

LOS ANGELES, Dec. 21.—Jim Rainy, the Yankee jockey, otherwise known as "Hustling Jim," has arrived with his "great pacer," and the railroad companies that carried the animal are the victims of one of the slickest tricks of the time. Jim beat his way through from Frankfort, Ind., to this city by dressing up an old plug of a horse as a great racer and traveling in the car with the horse. Jim made an artistic job on the animal. He clipped its neck of the long straggling hair and its legs were bandaged to conceal the knots that stood out on its knees like carbuncles. Red, white and blue ribbon was plaited in the carefully combed mane and tail, and when standing up to the flanks in straw with the blanket in its proper position the general appearance of the animal would have done credit to Nancy Hanks.

Hustling Jim inquired the rate on a horse valued at \$2,000 and a horse valued at \$100. The agent would make rates on a hundred dollar horse only, and it would amount to \$76. Jim finally accepted the low valuation and the bill was made out to collect. On arrival at Los Angeles Jim explained to the officials that as it was late and there was little help around he would come around after the animal "tomorrow." Jim never came. Freight Agent Chambers says that the most optimistic view could not raise the value of the animal above \$5.

A Flying Machine.

M. Trouvé recently exhibited before the French Academy of Sciences, a model of his "aviator," as he calls his flying machine. This, like some of the oldest forms of flying machines, is fitted with movable wings, but an ingenious arrangement has been adopted for putting them in motion. They are connected by a curved tube in which explosions are produced periodically, and these explosions tend to straighten out the tube and thus cause motion of the wings. Trials are said to have been made on a small scale with encouraging results. It is proposed to use explosive mixtures of hydrogen and air in subsequent experiments, the explosions in the recent trials having been, it is said, produced by cartridge discharges. A good many Frenchmen would like to own flying machines just now.

Ought To Be Sufficiently Comprehensive.

A recent resolution of the Central Traffic Association concerning a uniform basis for theatrical and excursion rates reads as follows: "That the General Passenger Agents are hereby instructed to agree upon rates for special and theatrical parties, and, when agreed upon, shall maintain same without deviation, and no commissions shall be paid directly or indirectly or allowance be made in cash or in passes or in free tickets or in partly free transportation or by furnishing special extra cars except at agreed rates, or by concessions from agreed charges for baggage, or in any other manner whatever to influence such passenger traffic."

It Was the Ganger's Daughter.

"What are we stopping so long at this place for?" asked a passenger of the guard at one of the sidings on the Midland line. "Well, you see, sir," responded the guard, "it's the ganger's daughter; the engine-driver's a-courting her, and as he don't get no time for love-making, he puts on steam before we gets here, and I allows him a few minutes extra. It's pleasant to think of them young folks having a chat together, and we shall put on speed after this and get on to the next station up to time, never fear."—*Diamond Fields Advertiser (South Africa).*

The Pasadena & Mt. Wilson Railroad.

The Street Railway Review for December contains an extended description of the Pasadena & Mt. Wilson road from which we abstract the following particulars: The road is a curious combination of a cable, trolley and storage batteries. Starting from Alheda, where it connects with the Los Angeles Terminal Railroad, the road is operated by a trolley system for two miles, the grade being 7 per cent. There is then a section of the road 2,600 ft. long in which there is a vertical rise of 1,600 ft. The car is drawn up this incline by an endless cable 1½ in. in diameter, the hoisting being done by an electric motor at the top of the incline. A safety cable ½ in. in diameter is also used. At this station there are 300 storage cells from which the power is drawn in hoisting and which are to some extent recharged by using the electric motor as a generator when the car is descending. The motive power for the road is obtained from a small mountain stream which has a very high fall. At present a tangential water-wheel is operated under a head of 1,400 ft., and this wheel is coupled directly to a generator which is used to charge the storage batteries at the station above mentioned and at other points along the line. Two similar water-wheels are to be installed at other points on the stream, each of which will operate under about the same head, or 1,400 ft.

After leaving the top of the incline the road follows a crooked route with grades averaging about 7.5 per cent. and curves of not less than 80 ft. radius for a distance of ten miles to the summit. The line is single track except the cable section. The general scheme of the road includes the erection of two hotels, one of them on Echo Mountain at the top of the cable incline, and the other on Mt. Wilson.

Bursting of a Fly Wheel.

A fly wheel in the steel mill of Oliver Brothers, at Pittsburgh, burst on Tuesday. One man was instantly killed, and twelve were injured, two of whom will die. The mill is considerably damaged.

Missouri Pacific Hospitals.

The St. Louis Republic prints an interesting article about the Missouri Pacific Railroad hospital in that city which is presided over by Dr. W. B. Outten, Chief Surgeon of the company. About 22,000 employees contribute to the support of the hospital system, paying from three to six dollars a year each. The number of persons treated by the hospital system yearly is about equal to the total number of employees, and over 13,000 of these come to the St. Louis hospital. There are small hospitals at other points. This department of the Missouri Pacific was established in 1879. The drug store connected with the St. Louis hospital deals out 4,000 prescriptions a month. The employees of the road, high and low, also have the privilege of consulting expert specialists, and about 6,000 visits of this kind were made in St. Louis last year. The Atchison, Topeka & Santa Fé and the Union Pacific have similar systems, and each one of these three roads employs over 200 local surgeons, whose duty is chiefly confined to emergency cases. The Republic prints several pictures, including one of a local surgeon at

work at a wreck, but the faces of the injured persons look as though their worst sufferings were caused, not by the train wreck, but by the painful efforts of the "artist." Whether these pictures were printed for the purpose of driving the reader to a hospital does not appear, but there is danger of such a tendency. It is estimated that 65 per cent. of the employees of the Missouri Pacific are Roman Catholics, and for this and other reasons the 14 nurses at the hospital are Sisters of Charity.

The Cable and Trolley in Philadelphia.

The street railroad companies of Philadelphia are actively engaged at present in preparing to extend their systems and to substitute mechanical for animal traction. Among the important extensions that will be made at once is that of the Philadelphia Traction Co.'s Market street cable system in two directions—along Woodland avenue to Forty-second street, to Chester avenue as far as Forty-ninth street, and also out Lancaster and Belmont avenues to Fairmount Park. A new power station at Thirty-third and Market streets will be completed in a couple of months. It is a large one and will be equipped with the best machinery. When this is in running order it will operate the system and the present station at Twentieth and Market streets is to be temporarily abandoned, enlarged, its plant vastly improved, and then it will operate the Market street system proper, while the Thirty-third street station will furnish power for the Woodland avenue and Belmont avenue lines. The company promises to greatly improve the service.

With the trolley, the plans of the Traction Co. are more extensive still. Chief among them is the building of an electric road along Ridge avenue to Manayunk. In the northwestern section of the city the erection of a large power station will be begun at once.

The People's Railway Co. contemplates the early introduction of the trolley on the entire 46 miles of its road, while the presidents of the Fifth and Sixth avenues, the Third and Fourth street lines promise the same for their respective lines, the latter of which will probably be extended, upon the adoption of electricity, beyond Frankford to Cedar Hill.

LOCOMOTIVE BUILDING.

The Boston & Albany has ordered 12 passenger engines to be built at the Rhode Island Locomotive Works. Six of these are to be six-coupled, a new type of passenger engine for that road.

The Grant Locomotive Works have contracted to build 25 locomotives for the Burlington & Missouri River lines. These engines are to be the class K 10-wheelers, which have 19 x 24-in. cylinders, 60-in. boiler shell and 9-ft. Belpaire firebox.

The Norfolk & Western has ordered 20 compound consolidation locomotives, Vaucrain type. These engines will have 56-in. drivers, cylinders 14 and 26 x 24 in., and will weigh about 130,000 lbs. The same road has in service 15 10-wheel passenger engines compounded on the Vaucrain system. These have 68-in. drivers.

CAR BUILDING.

The Stineham Coal & Coke Co., of Philadelphia, a newly organized company, with mines at South Fork, Cambria County, Pa., will, it is reported, soon order 300 coal cars.

The Norfolk & Western has placed an order with the Roanoke Machine Works for 560 hopper-bottom coal cars, 25 freight cabin cars, two wrecking cars and two supply cars.

The Litchfield Car & Machine Co. is building 500 Blue Line cars for the Indiana, Illinois & Iowa, which will be equipped with air brakes, metal brake beams and other improved appliances. Mr. T. P. Shonts, General Manager of this line, has adopted a new trade mark which will be used on these cars and which consists of a white star on which is the number 3 and an eye.

BRIDGE BUILDING.

Frankford, Pa.—Cofrode & Saylor shipped from their works at Pottstown, Pa., last week a long bridge girder for the Philadelphia & Reading bridge on the new line at Frankford, near Philadelphia. It is 100½ ft. long, weighing over 35 tons.

Philadelphia, Wilmington & Baltimore.—Seven new bridges have been constructed along the Philadelphia, Wilmington & Baltimore road within the past few months. The new iron structure near Burmont Station on the Media branch is nearing completion.

Salem, Mass.—The Essex County Commissioners will construct a bridge over the Parker River, near Newburyport. The cost is apportioned as follows: Newburyport, 700; Rowley, \$500; and County of Essex, \$2,500.

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

In Arkansas, in an action to recover the statutory penalty from a railroad company for refusing to deliver certain freight on tender of the charges shown on the bill of lading, it appeared that the freight was received for shipment, and the bill of lading executed by another road; that defendants, on receiving the goods from the connecting line, paid the charges as shown on the way-bill, which were in excess of those on the bill of lading; that if the freight was shipped by the route it traveled, the shipping carrier had no authority to bind defendant and the connecting line to carry at the rate specified in the bill of lading; that if shipped at an authorized rate, it was misrouted by a preceding carrier, for whose act defendants were not responsible, and the freight came to defendants bound by the charges of their connecting line. The Supreme Court rules that plaintiffs must pay the rates paid by defendants to their connecting line, in full, their remedy being against the railroad company which shipped the goods by an unauthorized route, and defendants are entitled to hold the goods until the freight is paid.

In the same state, in another case it is held that when the first of connecting carriers guarantees a through rate on a shipment to a point on one of the other lines, the last carrier has a lien on the freight for its own charges, together with the charges of previous carriers advanced by it in ignorance of the guaranty, though the sum of these charges is more than the rate guaranteed.

The Supreme Court of Maine rules that when horses are delivered to a railroad in good condition, and when they reached their destination one was paralyzed and

the other sick, and they died a few days thereafter, the burden is on the carrier to show that the loss was not due to an act of God or of the public enemy.²

The Supreme Court of Alabama holds that under the code providing that a railroad engineer must, "on perceiving any obstruction on the track, use all the means within his power known to skillful engineers, such as applying brakes and reversing engine, in order to stop the train," the duty to take precautions against inflicting injuries to live stock on the track arises, not only when the engineer sees an animal on the track, but also when, by the exercise of due diligence, he could have seen it; and a failure in either of these respects is negligence for which the railroad company is liable.¹

In Georgia the Supreme Court decides that in determining the question of damages for constructing a railroad in a street, and assessing the amount, the physical property (land and buildings) and the easement of access thereto are not to be considered as having separate values, as if they were two different pieces of property, but are to be treated as parts of one and the same estate. Whether damage has been done or will be done by the construction and use of the railroad depends upon whether the market value of the whole estate as one object of ownership has been or will be diminished by reason of devoting the street to this new use.³

Injuries to Passengers, Employees and Strangers.

The Supreme Court of Georgia rules that where a conductor accepts a passenger's fare after having been informed at what station she desires to alight, it is his duty to stop the train there and permit her to do so.⁴

In Alabama a brakeman on defendant's railroad was killed by falling from a box car, in the top of which, near the brake, was a hole, according to some witnesses four feet long, and according to others four feet square. Deceased was last seen alive standing at the brake, near this hole. The Supreme Court holds that there was evidence for the jury to consider that the death of deceased was owing to the hole in the top of the car.⁵

In the Federal Court it is laid down that the foreman of an extra gang of track repairers, whose sole duty it was to supervise the work of track repairing over some 18 or 20 miles of road, to hire the men necessary to do that work, and to direct the operations of the force so employed, is a vice principal, for whose negligence the railroad company is liable, where a workman in said gang was injured while under his orders.⁶

So in the Federal Court it is ruled that a railroad is liable for injuries received by a brakeman in a collision caused by the negligence of a conductor and engineer in disobeying the train dispatcher's orders.⁷

The Supreme Court of Alabama holds that running a train at a high rate of speed, at a point where the trainmen have reason to think it likely that persons are on the track, as in a city or populous district, or failure to keep a lookout at such a point, is negligence which will render the company liable for resulting injuries, though the injured person was guilty of contributory negligence, and the trainmen were without fault after they discovered his danger.¹⁰

In Missouri the Supreme Court rules that, the proximate cause of the death of a fireman on a train which collided with cars belonging to another train being the failure of a fellow-servant to set the brakes on the cars, and thereby prevent their running down a grade, a recovery cannot be based on the negligence of the trainmaster in running the two trains too close together, where there is no proof that they were dangerously near if proper care had been taken.¹¹

In New York the Supreme Court holds that the fact that a brakeman who had been discharged, and who would have had no chance for re-employment by the company had his identity been known, obtained re-employment under an assumed name, does not justify the company, after having had the benefit of his services and in the absence of any damage, in refusing to pay him for the said services on discovery of the deception.¹²

In Virginia, the plaintiff, an engineman, started his train from a station and ran 730 yds., attaining a speed of 20 or 25 miles an hour, when he saw freight cars about 40 yds. ahead, which had been stored on a siding, but had got loose and moved down on the main track. Plaintiff reversed his engine and jumped, breaking his leg. The freight cars had moved the switch so as to expose the red target, which the plaintiff might have seen, as well as the cars themselves, in ample time to stop the train. Besides, he was approaching a bridge in course of construction, at a forbidden rate of speed. The Supreme Court holds that he was negligent and that his contention that he could not see the danger signal nor the cars on account of fog was no excuse for him, in view of a rule of the company, with which he was familiar, providing that "a signal imperfectly displayed, or the absence of a signal at a place where a signal is usually shown, must be regarded as a danger signal."¹³

In New Mexico it was alleged that the railroad failed to furnish the deceased, a freight conductor, with a proper caboose, but supplied him with a poorly built box car, without doors or windows in the ends or lookout station in the top; that decedent used this car on the promise of defendant that it would furnish a proper caboose, which it failed to do; and that one of defendant's trains negligently ran into the rear of decedent's train, and decedent was struck by the locomotive and flying splinters, and died from the effects of the injuries. There was no allegation that the accident resulted because decedent could not see the approaching danger by reason of the absence of windows and a cupola in the box car. The Supreme Court holds that the negligence of the fellow-servants operating the second train was the proximate cause of the accident, and not the failure of defendant to furnish a proper caboose.¹⁴

The Supreme Court of Missouri rules that railroad section hands engaged in ballasting the railroad track with stone, which is hauled to them on a construction train, and unloaded by the trainmen, are in a common employment, and are fellow-servants with the trainmen. Three judges dissent from this conclusion.¹⁵

In the same state it is held that an engineer of a train and a track repairer, employed on the same road, are not fellow-servants.¹⁶

In Pennsylvania the death of an engineer was alleged to have been caused by the negligence of the company in keeping him in continuous service beyond human endurance. It appeared that it was optional with him whether he made the trip on which he was killed, and that before going he found that he would get extra pay. The accident was caused by his running, while asleep, into a standing train, of which he had been warned. It also appeared that the flagman of the standing train had neglected his duty of going back to signal any approaching train. The Supreme Court holds the railroad not liable.¹⁷

In the Federal Court while a coal train of defendant railroad company, whose tracks ran over the docks of a coal company, was delivering coal to the latter com-

pany, a brakeman of the coal company, engaged in coupling cars of the train, was injured by the negligence of the defendant's engineer. The Court decides that such engineer was not a fellow employee of the injured brakeman, he not being under the power and direction of the coal company, engaged exclusively in doing its work or "lent" to it for the occasion.¹⁸

In Michigan a person who had the entire charge of a logging train, and was responsible for the manner in which it was loaded, was killed by the falling of a dead tree, which stood so near the track that it was struck by the flaring end of a log so loaded as to project over the side of the car. He had passed the tree with the train about a thousand times before, and on two occasions—one on the day of the accident—the loads, though passing in safety, had grazed the tree. He had spoken to the superintendent and the foreman, and they had promised to have it cut down. Just before the train started, his attention was called to the projection on the log, but he replied, "Let her go to h—." The Supreme Court holds that the improper loading was the proximate cause of the injury, and therefore he could not recover.¹⁹

In Georgia the Supreme Court holds that where an engineer in violation of law failed to check the speed of his train in approaching a public crossing, he had no right to assume, on seeing a man on the track, that he would get off in time to save himself, and act on that assumption until he discovered, too late to check the train effectually, that he was inattentive to his danger.²⁰

The Supreme Court of Missouri rules that where the track and right of way of a railroad in a city are habitually used by the public for a way to the city streets, and there are gates in the railroad fence to enable pedestrians to go upon the track, a person walking upon such track on his way to a street is not a trespasser.²¹

¹ Fordyce v. Johnson (Ark.), 19 S. W., 1050.

² Loewenberg v. Arkansas & L. Ry. Co., 19 S. W. Rep., 1051.

³ Dow v. Portland Steam Packet Co., 21 Atl. Rep., 945.

⁴ Cent. R. Co. v. Lee, 11 South. Rep., 423.

⁵ Streyer v. Georgia S. & F. R. Co., 15 S. E. Rep., 637.

⁶ Caldwell v. R. & D. R. Co., 15 S. E. Rep., 678.

⁷ Bromley v. Birmingham M. R. Co., 11 South. Rep., 341.

⁸ Northern Pac. R. Co. v. Peterson, 51 Fed. Rep., 152.

⁹ North. Pac. R. Co. v. Cavanaugh, 51 Fed. Rep., 517.

¹⁰ Nave v. A. G. S. R. Co., 11 South. Rep., 391.

¹¹ Relyea v. K. C., Ft. S. & G. R. Co., 19 S. W. Rep., 1116.

¹² Foley v. W. N. Y. & P. R. Co., 19 N. Y. S., 826.

¹³ Williams v. N. & W. R. Co., 15 S. E. Rep., 522.

¹⁴ Lutz v. A. & P. R. Co. (N. M.), 30 Pac. Rep., 912.

¹⁵ Parker v. H. & St. Joe R. Co., 19 S. W. Rep., 1119.

¹⁶ Schiereth v. M. P. R. Co., 19 S. W. Rep., 1134.

¹⁷ Nathness v. P. & R. R. Co., 24 Atl. Rep., 733.

¹⁸ Cent. R. Co. of N. J. v. Stoermer, 51 Fed. Rep., 518.

¹⁹ Powers v. Thayer Lumber Co., 52 N. W. Rep., 937.

²⁰ G. R. & B. Co. v. Daniel, 15 S. E. Rep., 638.

²¹ Lynch v. St. Joseph & I. Ry. Co., 19 S. W. Rep., 1114.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Burlington, Cedar Rapids & Northern, semi-annual, 1½ per cent., payable Feb. 1.

Canadian Pacific, semi-annual, 5 per cent., payable Feb. 17.

Central of New Jersey, quarterly, 1¼ per cent., payable Feb. 1.

Denver & Rio Grande, semi-annual, 1¼ per cent., payable Feb. 20.

Louisville & Nashville, semi-annual, 2 per cent., payable Feb. 3.

Mahoning Coal, semi-annual, 5 per cent., payable Feb. 1.

Nashville, Chattanooga & St. Louis, quarterly, 1¼ per cent., payable Feb. 1.

Toledo & Ohio Central, quarterly 1¼ per cent., on the preferred stock, payable Jan. 25.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Bartley, special, Philadelphia, Jan. 16.

Fort Wayne & Jackson, annual, Jackson, Mich., Jan. 25.

Indiana, Illinois & Iowa, annual, Kankakee, Ill., Jan. 18.

Malone & St. Lawrence, special, New York City, Jan. 16, to take action upon a proposition to lease the road to the Central Vermont.

New York & Long Island, annual, New York City, Jan. 18.

Terre Haute & Peoria, annual, Decatur, Ill., Jan. 18.

Texas, Sabine Valley & Northwestern, special, Longview, Tex., Feb. 13, to increase the capital stock.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* holds regular meetings at the United States Hotel, Beach street, Boston, Mass., on the second Wednesday of each alternate month, commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at 7:30 p. m., at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January.

The *Northwestern Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Wesleyan Hall, Bromfield street, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

The *Engineers' and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers held on the evening of Jan. 4, a paper by Alva J. Grover, Assoc. Am. Soc. C. E., on "Flood Waves in Sewers and Their Automatic Measurement" was read. An abstract appeared in our issue of the 6th. The subject was briefly discussed by Messrs. Herschel and Collingwood. Mr. Edward Bates Dorsey, M. Am. Soc. C. E., described the improvements now being made in the harbor of Tampico under the direction of Mr. E. L. Corbell, Consulting Engineer, and Mr. A. F. Wrotnowski, engineer in charge, by which, by the natural current of the river, without any dredging, a depth of water of 8 ft. has been increased to 20 ft.; the river ten miles above the harbor of Tampico being a quiet, broad river a mile wide, narrows down at the point where the jetties are placed to 800 ft. Mr. Dorsey stated that Mr. Corbell estimated the current at this point in this river to be greater than that through the South Pass in the Mississippi River. The Secretary announced the death, on Dec. 25, 1892, of Mr. H. Stanley Goodwin, member of the Society. The following persons were declared elected as the result of the canvass of the ballot: *Members:* John Watson Alvord, Chicago, Ill.; James Francis, Lowell, Mass.; Alfred Rosenzweig; Henry Norlande Rutan, Winnipeg, Manitoba. *Associate Members:* Keenerly Bryan, Chicago, Ill.; Shrewsbury Beauregard Miller, Hoboken, N. J.

New England Railroad Club.

The regular meeting of the Club was held at the United States Hotel, Wednesday, Jan. 11, at 7:30 p. m. The subject discussed was the "Substitution of Steel for Iron in Construction of Railway Rolling Stock." Mr. George Richards read a paper on this topic.

Western Railway Club.

The next meeting of the Western Railway Club will be held on Tuesday, Jan. 17, Rookery Building, Chicago, at 2 p. m. Mr. G. W. Rhodes, Superintendent Motive Power of the Chicago, Burlington & Quincy, will read a paper on "Wheel Flanges."

Western Society of Engineers.

The annual meeting and banquet of this Society was held at the Sherman House in Chicago last week. The officers elected for the coming year are as follows: *President*, Robert W. Hunt; *First Vice President*, R. A. Rust; *Second Vice President*, H. B. Herr; *Secretary and Librarian*, John W. Weston; *Treasurer*, E. G. Nourse; *Trustee*, Geo. S. Morison. The President's address was delivered by the outgoing President, Isham Randolph. Papers were read by O. Chanute and L. E. Cooley and an interesting musical programme was offered.

PERSONAL.

—Mr. Henry Ryder, Master Mechanic of the Housatonic road, which is now operated as the Berkshire Division of the New York, New Haven & Hartford, resigned that position this week.

—Mr. Howard J. Lyons has been appointed General Freight Agent of the Atlantic system of the Southern Pacific, vice Mr. C. W. Bein, promoted to other duties in Texas.

—Mr. Elijah Pugh, Superintendent of the Pennsylvania Railroad's West Philadelphia grain depot, and

brother of General Manager Charles E. Pugh, died at Philadelphia this week.

—Mr. Charles H. Ketcham, Superintendent of the Dunkirk, Allegheny Valley & Pittsburgh, will become Superintendent of the Western Division of the West Shore on Feb. 1, in addition to his present duties.

—Mr. J. W. Musson, who resigned last week as General Traffic Manager of the West Shore, will be Manager of the Nickel Plate freight line, succeeding Mr. C. S. Tappen, who has been Manager for the 10 years since the organization of the line.

—Mr. N. E. Chapman died suddenly in Philadelphia Jan. 9, aged 63 years. Mr. Chapman was formerly connected with the Latrobe Steel Works, and was previously Master Mechanic of the Baltimore & Ohio, and also held a similar position on the Cleveland & Pittsburgh.

—Mr. Edward Langworthy, of Dubuque, Ia., formerly President of the Dubuque & Southwestern Railroad and a director in lines now incorporated in the Illinois Central and Chicago Great Western and other Chicago roads, died at Dubuque, Jan. 4. He was, at his death, a director of the First National Bank.

—Mr. C. P. Huntington, President of the Southern Pacific, some time ago built a handsome and complete public library at West Chester, N. Y., where he has a country house, and last week it was announced that he had added \$100,000 to his gift, the income of which is to go to the support of the library.

—Mr. John Orton, formerly Superintendent of Rolling Stock and Machinery of the Toledo, St. Louis & Kansas City road died at Frankfort, Ind., Jan. 8. He was Mechanical Superintendent at one time of the Canadian Southern and afterward held a position in the motive power department of the New York Central & Hudson River road.

—Mr. Charles E. Alger, Division Engineer on the Boston & Albany at Springfield, Mass., died in that city on Jan. 4 at the age of 39. Mr. Alger had been in poor health since 1888, the result of exposure in the great storm of March of that year. He leaves a widow and three children. He had been with the Boston & Albany since 1879, and was a skillful and painstaking engineer. He had also done some original work.

—Mr. Charles W. Lanpher, Superintendent of Transportation of the New York, Ontario & Western, who tendered his resignation of that position some time ago, will retire from that office on Feb. 1, but will still continue in the employ of the company and will have charge of the coal department. Mr. J. P. Bradford, Superintendent of the Western Division of the West Shore, will become General Superintendent of the New York, Ontario & Western on Feb. 1, as reported last week.

—Mr. H. M. Steele, recently Assistant Chief Engineer on the Erie, has accepted a position as southern agent of the Hall Signal Company. His headquarters will be in Baltimore, in the Equitable Building. It is proposed to establish there a comprehensive exhibit of the Hall appliances and to carry on from that point the same constant and vigorous "campaign of education" that is now being conducted from the New York and Chicago offices. Within a few months the company has established an office at Boston also, where the representative is Mr. H. E. Boothby.

—Mr. C. W. Bein, who has been appointed Traffic Manager of the Texas lines of the Southern Pacific, to succeed Mr. Daniel Ripley, resigned, has been in the service of the company for some years at New Orleans. He became connected with the Southern Pacific in September, 1883, as a clerk in the rate department. He was made Chief Rate Clerk, and then Chief Clerk of the rate department. On Jan. 1, 1889, he was appointed Assistant General Freight Agent, and in July of the same year he was named the General Freight Agent of the Southern Pacific, Atlantic system.

—A famous naval architect and marine engineer is dead, Admiral Paoloret Simonio di St. Bon, of the Italian Navy and Minister of Marine of the Italian Government, who was the originator of that type of man-of-war whose main feature is preponderance of armament to the sacrifice of protection. The finest existing examples of this class are those monstrous floating batteries the Lepanto and Italia of the Italian Navy. Admiral di St. Bon had become greatly interested in the forthcoming Congress of Engineers to be held in Chicago during the World's Fair, and was one of the presidents of the Division of Marine Engineers and Architecture, and it is by his efforts and consent that a number of engineers of the Italian Navy will come over to attend its sessions.

—Several changes in the management of the Bethlehem Iron Works took effect Jan. 1: John Fritz withdrew from the superintendency of the works and was succeeded by Owen Leipert. Mr. Fritz has retained the position of Consulting Engineer, and will be relieved of nearly all the physical work he has for years performed. The former Assistant Superintendent of the works, Russell W. Davenport, has been made the Second Vice-President of the company. Robert H. Sayre, Jr., will succeed Mr. Davenport as Assistant Superintendent of the works. He has for some time been Acting Assistant Superintendent. Albert L. Colby, the Head Chemist, has been promoted to the place of Metallurgical Engineer, and will have the superintendency of the blast furnace. Mr. Leipert, the new Superintendent, learned the machinist's trade in the machine shop of the Crane Iron Co., at Catsasqua, Pa. He has been at Johnstown, Pittsburgh and Wheeling, and had charge of the Bessemer mill at Bethlehem when it was the leading steel rail plant in the country. The Bethlehem Iron Co. has twice sent him to Europe to study machinery in the interest of the company.

—Mr. P. C. Shull, Travelling Auditor of the Ohio & Mississippi, has resigned to assume direction of a considerable mining property at Leadville, Colo. Mr. Shull's earlier railroad experience was as Car Accountant of the Springfield & Illinois Southeastern. In 1876, when that road became the Springfield Division of the Ohio & Mississippi, he entered the Auditor's office of the latter, and became Travelling Auditor in 1879. We are informed that in the fourteen years during which he has held this position, the road has been absolutely free from loss by defalcation of agents or cashiers at any one of the nearly 150 stations under his supervision. So exceptional a record certainly indicates good men and good methods, as well as fidelity and vigilance on the part of the traveling auditor; and in mentioning it we should not omit the name of Mr. E. P. Cutter, the Secretary and Auditor, under whom the system has grown up and been administered.

Mr. Shull is succeeded by Mr. Frank D. Hodgson, who has been his assistant for several years past.

—Mr. John L. Farmer, of the celebrated signaling firm of Saxby & Farmer, died Dec. 12, 1892. Mr. Farmer entered railroad life many years ago on one of the Irish lines. Later he became Assistant Traffic Manager of the London, Brighton & South Coast, and in 1862 went into partnership with Mr. Saxby. Mr. Saxby, who was employed in the engineering department of the Southeastern Railway, had invented his first interlocking apparatus and offered the patents to Stevens & Sons, who were already in the field of signaling, for £500. The offer was refused, and the firm of Saxby & Farmer was formed. The firm built the works at Kilburn, where an extensive and successful signaling business has been carried on. Our readers are so familiar with the devices and methods known under the name of Saxby & Farmer that it is not necessary to recapitulate any of them here, but probably it would not be too much to say that that firm, as a firm, has done more than any other one institution to develop the modern practice of signaling. We do not understand, that Mr. Farmer was an engineer or devoted himself particularly to the strictly technical side of the business, of which he was for many years virtually business manager. The business will be continued under the same management and name as heretofore.

ELECTIONS AND APPOINTMENTS.

Brookfield & Northern.—The stockholders of this new road have elected officers for the ensuing year as follows: L. S. Bowden, President; R. H. Wheelock, Vice-President; J. R. Huffaker, Secretary; John Ford, Treasurer, and W. J. Cox, General Manager, with headquarters at Brookfield, Mo.

Charleston, Cincinnati & Chicago.—A. N. Molesworth, formerly Chief Engineer, has been appointed Superintendent of the road, to succeed H. E. Englesing. His headquarters are at Johnson City, Tenn.

Charleston, Sumter & Northern.—C. Millard has been appointed Superintendent in addition to his present duties as Chief Engineer. E. D. Kyle, General Freight and Passenger Agent, having resigned to accept service elsewhere, the jurisdiction of J. H. Averill, General Manager, has been extended over the traffic department.

Chicago Great Western.—Arnold Kalman has been elected Vice-President, succeeding Charles T. Nichols.

Chicago, Milwaukee & St. Paul.—F. W. Getty has been appointed Acting Superintendent of sleeping car department, vice J. B. Elwood.

Cleveland & Pittsburgh.—At the annual meeting last week directors were chosen as follows: R. F. Smith, J. V. Painter, E. R. Perkins, H. A. Hanna and H. C. Ranney, of Cleveland; E. A. Ferguson, of Cincinnati; J. T. Brooks, of Salem, O.; George B. Roberts, of Philadelphia; H. Darlington, of Pittsburgh; Charles Lanier, William D. Eggleston and J. S. Kennedy, of New York City.

Denison & Wichita.—At a meeting at Denison, Tex., Jan. 6, the following officers and directors were elected: W. B. Munson, President; C. G. Hedge, Secretary and Treasurer; Thomas Fleming, Superintendent. Directors: W. B. Munson, Edward Perry, J. C. Field, W. S. Nevins, of Texas, Colgate Hoyt, Henry C. Rouse, C. W. Wetmore, of New York, Thos. C. Purdy, Kansas.

Erie & Pittsburgh.—The stockholders of the road have this week elected officers and directors as follows: Charles H. Strong, President; W. R. Brewster, Secretary and Treasurer. The other directors are: M. H. Taylor, Erie, Pa.; George B. Roberts and C. H. Fairchild, Philadelphia, and James McCrea, of Pittsburgh. The new director is G. B. Roberts.

Evansville & Terre Haute.—Since Jan. 1, 1893, the handling of all freight claims has been assumed by the Accounting Department. D. F. Waugh is appointed Freight Claim Agent, with office at Evansville, Ind. He acts for the above road and the Louisville, Evansville & St. Louis, and Peoria, Decatur & Evansville.

Gulf, Colorado & St. Paul.—James M. Steere having resigned as Assistant General Freight Agent of this company, the office has been abolished. Bryan Snyder has been appointed Division Freight Agent, with headquarters at Dallas, Tex.

Harriman Coal & Iron.—F. A. Farleigh is now the Chief Engineer of this road, his headquarters being at Harriman, Tenn.

Iowa Central.—E. C. Palmer, Jr., has been appointed Assistant General Freight Agent, vice H. A. Hausgen, resigned. His headquarters will be at Marshalltown, Ia.

Kansas City, Wyandotte & Northwestern.—The Missouri Pacific has assumed the operation of this road as already reported, and the jurisdiction of the various heads of departments have been extended over the road. C. M. Rathbun, Superintendent of the Western Division of the Missouri Pacific, with headquarters at Atchison, Kan., has been appointed General Superintendent of the road.

Knoxville, Cumberland Gap & Louisville.—W. B. Bradley has been appointed General Passenger and Freight Agent of the road, to succeed W. A. Bly. Mr. Bradley holds a similar position on the Marietta & North Georgia road, and his headquarters will be at Knoxville, Tenn.

Louisville, Evansville & St. Louis.—T. A. Allen has been appointed Chief Engineer, with charge of the Engineering Department, and of the bridges, buildings, etc., with headquarters at Evansville, Ind.

Mexican Central.—The following changes have been made in the mechanical department: Thomas Smetthurst, Master Mechanic, at Guadalajara, Mex., has been transferred to Jimulco to succeed J. S. Turner, resigned. C. E. Shackford has been transferred from San Luis Potosi to Guadalajara to succeed Mr. Smetthurst, and D. M. Haynes, recently General Foreman in the shops in the City of Mexico, has been appointed Acting Master Mechanic at San Luis Potosi, Mex., in place of Mr. Shackford.

Missouri, Kansas & Texas.—Samuel Irvin has assumed the office of Master Car Builder of the lines in Texas to succeed Robert Walker, who tendered his resignation a month ago.

New Orleans & Northwestern.—T. E. Morrison has been appointed General Agent, with headquarters at Natchez, Miss. Mr. Morrison succeeds W. Dunbar Jen-

kins, whose title was General Manager. He has appointed J. M. Barkley as his assistant.

Paris & Great Northern.—The stockholders held their annual meeting at Paris, Tex., Jan. 4 and elected the following directors: Allen Manvel, John Martin, S. J. Wright, W. J. McDonald, H. L. Morrill, E. D. Kenna, John C. Gibbons and A. Douglass. The directors elected Allen Manvel President and Chas. Griffith Secretary and Freight Agent.

Peoria, Decatur & Evansville.—T. A. Allen has been appointed Chief Engineer, in charge of the bridges, buildings, etc., with headquarters at Evansville, Ind.

Philadelphia & Reading.—The headquarters of E. W. Drinker, as Division Freight Agent, will be at Wilkes Barre, Pa.

Portland, Monterey & Gulf.—Among the incorporators of this new Texas road are: W. S. Dunlop, of Little Rock, Ark.; John S. Little, M. S. Gaines and Jesse A. Belle, of Greenwood, Ark.; A. B. Hall, of Monticello; State Treasurer R. B. Morrow, T. E. Little, C. McCulloch and O. S. Reff, all of Little Rock; John Willacy, of Portland, Tex.; J. C. Atkins, of Estherville, Ia., and W. K. Carlisle, of Chicago.

Rio Grande & Eagle Pass.—W. L. Giddens, General Manager of the road, has resigned and has been succeeded by P. J. Milan, until recently Superintendent of the Matamoros branch of the Mexican National. His headquarters are at Laredo, Tex.

St. Louis, Cape Girardeau & Fort Smith.—General Manager Eugene S. McCarty has also assumed the duties of Superintendent.

St. Louis, Kennett & Southern.—E. F. Blomeyer has been appointed General Freight and Passenger Agent with headquarters at Cape Girardeau, Mo.

Seaboard Air Line.—Carroll H. Smith has been appointed General Western Agent, with headquarters at St. Louis. Mr. Smith was formerly Western Agent of the Savannah, Americus & Montgomery, and at one time General Eastern Agent of the same system in New York City.

Sioux City & Northern.—E. S. Johnson has been appointed Chief Engineer of this road and of the Sioux City, O'Neill & Western, with office at Sioux City, Ia.

Southern Pacific.—Daniel Ripley, Traffic Manager of the Galveston, Harrisburg & San Antonio, the Texas & New Orleans and the Louisiana Western Extension road, having resigned, C. W. Bein has been appointed to the office, with headquarters at Houston, Tex.

Tavares & Gulf.—J. S. Martin has been appointed Assistant General Freight and Passenger Agent of the road, with headquarters at Orlando, Fla.

Union Pacific.—D. S. Hooker has been promoted to the position of Assistant Division Engineer and will assume charge of the work in the southern part of Colorado. He has been connected with Division Engineer W. J. Ashton's office at Denver for three or four years.

F. B. Southard has been appointed Auditor of Passenger Accounts, vice W. S. Wing, resigned. Mr. Southard has been Auditor's Chief Clerk for three years.

Western New York & Pennsylvania.—The stockholders held their annual meeting at Philadelphia, Jan. 9, and elected the following directors: Samuel G. De Coursey, Nicholas Thouran, George Bartol, Charles M. Lea, J. Rundel Smith, William G. Bullit, John K. Barclay, E. W. Clark, Jr., E. L. Owen, P. P. Pratt, Isaac N. Seligman, J. Roell and Rudolf Fliensch.

Western Railroad Association.—The annual meeting was held in Chicago, Jan. 11, and the following officers were elected: President, B. F. Ayer; Secretary, C. R. Babeuf; Treasurer and General Counsel, George Payson. The following constitute the Board of Directors for 1893: B. F. Ayer, W. H. Lyford, John Newell, H. H. Poppleton, J. H. Wood, W. E. McDoel, T. F. Withrow, A. J. Earling, B. C. Cook, J. D. Springer, W. F. Merrill and E. St. John.

West Shore.—The local freight traffic since Jan. 2 has been handled under the immediate supervision of three division freight agents who have been assigned to duty, as follows: L. Merritt, Division Freight Agent, with office at No. 29 Board of Trade Building, Buffalo, N. Y.; C. L. Van Wert, Division Freight Agent, with office at 207 Kirk Block, Syracuse, N. Y., and W. A. Higham, Division Freight Agent, with office 5 Vanderbilt avenue, New York.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

Ahnapee & Western.—The construction of the line to Ahnapee, Wis., which was undertaken early in 1892, has been completed, the distance from Casco Junction being 14 miles. The road is now being extended from Ahnapee northeast to Sturgeon Bay, 20 miles. The grading and bridge work is being done by the company's own forces, and is not let to contractors. E. Decker, of Ahnapee, Wis., is President.

Altamont & Manchester.—Very little work was done on this road during 1892 beyond completing five or six miles of grading, and the track on the first three miles east of Altamont, Ky., to Lucile. The road has been surveyed for about seventeen miles farther east to Manchester, Ky., and it is stated that the greater part of this will be built in 1893.

Baltimore Belt.—Fairly good progress was made in the construction of the road during December, and at the present rate of progress it is said by the engineers that the tunnel and other works will be completed by April.

Bay of Quinte Railway & Navigation Co.—Work is now under way on an extension of the road formerly known as the Kingston, Napanee & Western from Harrowsmith to Sydenham, Ont., a distance of about four miles. The company is doing all the work, except the masonry, with its own forces, and about one mile of the line is now graded, 50 men being employed on the work. The contract for the masonry has been let to Hugh Stewart, of Tweed, Ont. The maximum grades are 79 ft. to the mile and the curves 6 deg. The only bridge work is a 30 ft. structure over a highway.

Bellingham Bay & Eastern.—The company has applied to the City Council of New Whatcom, Wash., for an ordinance to build a road through certain of the

streets of the town, the company now running its trains into the New Whatcom over the tracks of a street railroad. It is proposed to build about four miles of new road from the coal bunkers on Puget Sound, at New Whatcom, to the Blue Cañon mines.

Boston & Albany.—The extension of this line through Colquitt County, in the southern part of Georgia, which has been building during the latter part of 1892, will probably be completed to Moultrie, Ga., the proposed terminus, by March 1st next. About 10 miles of track is already laid from Hollis, near Boston, north through McDonald and Rozier to Dot, Ga. C. W. Pidcock, of Round Lake, Ga., Superintendent of the road, has charge of the construction work, which is being done by the company directly.

Buffalo, Rochester & Pittsburgh.—A second track is now being built between Mt. Jewett near the Kinzua viaduct and Johnsonburg, Pa., a distance of 22 miles. With the completion of this work and the opening of the Johnsonburg & Bradford, which will soon be in operation, the company will have practically a double track from Bradford to Johnsonburg, Pa. Long sidings are also being built at many points on the Buffalo and Rochester Divisions.

Buffalo & Susquehanna.—The track laying on this road between Hulls and Galeton, Pa., has been completed with the exception of about two miles. The road is the Eastern Division of the extension of the Sinnema-honing Valley from Costello east across Potter County to Galeton, 34 miles. The western end of the line from Costello to Hulls, Pa., 14 miles, was completed in 1892, the work being done under the charter of the Susquehanna Valley road. The contractors are D. A. Cragg, of Buffalo, N. Y., and Broadhead & Byron, of Galeton, Pa. F. H. Goodyear, of Buffalo, is President of the three roads mentioned above, and C. E. Bottsford is Chief Engineer of the new line.

Burlington, Cedar Rapids & Northern.—The Forest City extension was completed in 1892 for a distance of 31 miles from Forest City, Ia., west, and the balance of 15 miles to Armstrong, Ia., which is under contract to Kimball & McNamara, of Omaha, will be completed early this year.

Chicago, Rock Island & Pacific.—The newspaper report that this company proposed to build a cut-off between Atchison, Kan., which is now the western terminus of a short branch northeast to Pierce Junction, on the St. Joseph and Colorado line, is officially denied.

Chippewa River & Menominee.—This road has been extended during the year about five miles, the present terminus being at Deer Lake, Wis. An additional three miles is now under construction, and surveys will be made during the present year for an extension about 25 miles long toward Hayward, Wis. W. Irvine, of Chippewa Falls, Wis., is Secretary.

Clearfield & Mahoning.—The tracklaying was begun last week on this road, which is being built by the Buffalo, Rochester & Pittsburgh, and several miles of the track already have been laid. The line is 26 miles long and is to extend from Jefferson Line near Dubois on the Buffalo, Rochester & Pittsburgh, east across Clearfield County, to a connection with the Beech Creek road at Clearfield, Pa. The grading has been completed and the new road will be in operation in two or three months. J. M. Floesch, of Clearfield, Pa., is Chief Engineer, and W. E. Hoyt, of Rochester, N. Y., is Consulting Engineer.

Concord & Montreal.—About 20 miles of track was built by this company in New Hampshire during 1892 on two short branches. The extension of the Whitefield & Jefferson from Jefferson station east to a connection with the Grand Trunk, which was begun in 1891, was completed to New Berlin, N. H. The New Boston branch was built from Goldstown or Parker's Station near Manchester, N. H., south five miles to a point within a mile of New Boston, N. H., which will be the terminus.

Coos Bay, Roseburg & Eastern.—The bridge near McAdams, Or., was completed recently, and the track has now been laid south of Marshfield for about 15 miles to Coquille City, Or. Trains will soon be running as far as the track is laid, to the Coquille River, but the construction work will be suspended for some time until the company is authorized to build a bridge across the Coquille River. The road has been located for about 27 miles west of Coquille City toward Roseburg, Or., and preliminary surveys are now being made on the balance of the line to that point, about 65 miles beyond Coquille City. W. Z. Earle, of Marshfield, Or., is Chief Engineer.

Crystal River.—About 600 men are still employed on the line under construction near Coal Creek, the work now being done consisting principally of rock blasting. Five miles of track has been laid on the line from Crystal River crossing to the mouth of Coal Creek, Col., and six miles has been graded toward Coal Creek. This line is 17 miles long. The branch from Coal Creek to Coal Basin is 12 miles long. Both these lines are under contract to Ormant Cook, of Pueblo, Col. Surveys have been made from Coal Creek to Crystal and Yale Creek, 22 miles. The road is being built by the Colorado Fuel & Iron Co., and the rails are being rolled at the Pueblo mills of that company. The line will be in operation in June. The company owns 5,000 acres of coal lands along the road and plans have been made for 250 coke ovens. A large traffic is anticipated from the marble quarries.

Denver, Lakewood & Golden.—The extension to Barnum, Col., about seven miles from Denver, has been completed, and the first train to that point was run on Dec. 31. The motive power of the road is electricity, and it is mentioned in this column for the reason that while the road was being built the officers announced that it would be operated by steam locomotive. The mileage built by the company has been included in records of track laying, though it now appears that it will be a light line, for passenger traffic only.

Denver & Westminster.—This company was incorporated Jan. 3. The incorporators: D. R. C. Brown, and J. M. Downing, Aspen; R. W. Woodbury, M. Benedict, and H. J. Mayham, Denver. The object is to build a road connecting the Westminster University with Denver. Two lines will be built. A steam motor line is contemplated.

Detroit, Pontiac & Northern.—The charter of this company was filed in Michigan last week, the capital stock being \$500,000, and the principal office at Detroit, Mich. The route of the road is not given.

Duluth, Mississippi & Northern.—The road was completed during 1892 for about 15 miles north of the Mississippi River, the southern terminus being near

Swan River, Minn. Foley, Grant & Guthrie, and Williamson & Campbell are the contractors for the extension of the line 17 miles north of the present end of track. Besides this work, it is also proposed to build about ten miles of main line and lumber branches. W. A. Dafter, of Swan River, Minn., is the Chief Engineer.

Duluth Transfer.—This road now has a mileage of about seven miles, of which five miles was built in 1892 between Duluth and Ironton, Minn., a manufacturing suburb. The line will be extended 10 miles further this year. Foley Bros. & Guthrie, of St. Paul, having the contract for that amount of work between Duluth and Fond du Lac, Wis. Surveys may also be made for another 10 miles near Duluth. Day K. Smith, of Duluth, is President.

Excelsior Springs.—The charter of this company was filed in Missouri last week, the capital stock being \$150,000. It will construct a road from Excelsior Springs to the Milwaukee Station, a distance of two miles, thence to Cooley's Lake, 10 miles farther. The incorporators are: S. F. Scott, H. R. Robinson, T. A. Scott and P. Daugherty.

Fairmount Belt.—The track is now being laid on this belt line at Fairmount, W. Va., from the Monongahela junction with the Baltimore & Ohio. The line when completed will be about six miles long and will be operated by the Baltimore & Ohio. Thomas J. Steers & Co. are the contractors.

Findlay, Ft. Wayne & Western.—Train service was extended in December to Haverland, O., five miles west of Grover Hill, which has been the terminus of the operated road during 1892. The company built in 1892 twelve miles of track to Mackinaw, O., the work having been done in the first half of the year. The tracklaying has just been resumed and is now being laid to the Ohio and Indiana State line, 11½ miles from the present end of track. The road has been graded to near Ft. Wayne, Ind., about 20 miles beyond the Ohio State line.

Flint & Pere Marquette.—The company has built this year as usual a very fair amount of new mileage, but most of it on lumber branches. The most important work has been the extension of the line into the Union depot in Detroit, Mich., about five miles of track having been laid on this line in 1892. A narrow gauge extension two miles long was built to Grindstone City. The temporary logging lines constructed during the year aggregate about 20 miles; but this mileage is not included in our record of railroad construction.

Fort Worth & Rio Grande.—The engineer corps on the southwestern extension from Brownwood, Tex., have finished preliminary surveys for a considerable portion of the first section and are now preparing to begin the location.

Gouverneur & Oswegatchie.—The track laying east of Gouverneur, N. Y., along the Oswegatchie River was completed for about three miles on Jan. 1, and the work is still in progress to Edwards, N. Y., about 12 miles, nearly all the lines being graded. The road is a branch of the Rome, Watertown & Ogdensburg and is intended to reach paper mills near Edwards.

Grayling, Twin Lake & Northeastern.—This line has been in operation during the greater part of 1892 as a branch of the Michigan Central, and freight and passenger trains are now running over the road. It extends from Grayling, a point on the Michigan Central in Crawford County, to Lewiston, a new town, a distance of 29 miles. It was nearly all built in 1891, under the supervision of A. Torrey, now Acting Chief Engineer of the Michigan Central, but some of the track was laid in 1892, the road being finished in February last.

Great Northern.—The first through train into Seattle, Wash., over the Great Northern arrived at that city on Jan. 8. The train consisted of the private car of General Superintendent Shields, of the Western Division, and a second-class passenger car. The track was joined on Friday, Jan. 6, the last spike being driven in the Cascade Mountains, within a few miles of the western terminus of the switchback over the mountains.

The track laid on the Pacific extension in 1892 was about 558 miles, the end of track at the first of the year being at Kallispell, Mont. In 1891 about 122 miles of track was built through Montana, and in 1890 about 100 east from Pacific Junction. The track laid in Montana in 1892 was from Kallispell west to the western boundary on the Kootenai River, 122.4 miles. Track laid in Idaho, eastern boundary on Kootenai River to western boundary near Pend d'Oreille River, 82.7 miles. Track laid in Washington, from eastern boundary near Pend d'Oreille River to a connection with the Union Pacific at Spokane, 45.2 miles; from connection with Spokane Falls & Northern at Spokane to Columbia River, 160.5 miles; from Columbia River to Everett, via Cascade tunnel, to connection with Everett & Monte Cristo, 138.3 miles. Of the latter the portion not laid through the tunnel is 3.3 miles, making actual distance laid 135 miles. In Spokane track has not been laid on 4.8 miles, and the company is operating over the Union Pacific and Spokane & Northern. At Everett there will be three miles to lay from the Everett & Monte Cristo to connect with Seattle & Montana (the Great Northern's coast line). The switchback mileage over the Cascade tunnel is 10.2 miles, making the additional mileage by reason of the switchback, seven miles. The total mileage actually laid in the year was: Montana, 122.4 miles; in Idaho, 82.7 miles, and in Washington, including switchback, 350.9 miles; total, 556 miles. This leaves to be laid at some future time in Spokane 4.8 miles, Cascade tunnel, 3.3 miles, and Everett, three miles.

Jacksonville, St. Augustine & Indian River.—The tracklaying on the extension along the east coast of Florida, south of Daytona, has been completed to Rockledge, Fla., a distance of 65 miles, and the company expects to commence running trains by Jan. 20. As already noted, surveys have been made for a further extension of about 20 miles from Rockledge south to Melbourne, but the officers have not yet decided when the extension will be built. The new road was described in our issue of Nov. 18, 1892. Charles O. Haines, of Titusville, Fla., is Chief Engineer in charge.

Johnsonburg & Bradford.—The tracklaying has been completed on this road from Mt. Jewett, seven miles from Bradford, Pa., south around the headwaters of Kinzua River, to Howard Junction, Pa., a distance of about 20 miles. The road is being built by the Buffalo, Rochester & Pittsburgh, and will be operated for regular freight and passenger traffic in a few weeks.

Lake Erie & Detroit River.—The train service was extended last week from Leamington to Wheatley, eight miles, and to Merlin, Ont., a distance of 23 miles

from Leamington. A further extension is now under construction from Merlin to Blenheim, 13 miles, on which most of the grading has been completed, and also to Ridgewood, 10 miles farther east, which has been located. Joseph De Gurse, of Windsor, Ont., is Chief Engineer.

Lancaster, Oxford & Southern.—The line is now completed to within a mile of Providence Mills, Md., a distance of 4½ miles from Childs Station, where the line connects with the Baltimore & Ohio. Surveys have been made from Providence Mills north to Oxford, Pa., nine miles, and the work will probably be continued to that point early this spring. W. Connell, of Wilmington, Del., is the contractor.

Louisville Terminal.—Three miles of this road at Louisville, Ky., have already been built, six miles are now under construction, and surveys are being made for an additional ten miles. The contract for grading the six miles of road now under construction has been awarded to Joseph Coyne & Co., of Louisville. The road is being constructed for the purpose of facilitating the interchange of carload freight between the different railroads centering at Louisville, and for the development of new industries and the building up of suburban towns along its line. George L. Danforth is President, J. C. Fawcett, General Manager, and C. C. McClarty, Secretary, all of Louisville.

Missouri, Kansas & Eastern.—The first train on the new line along the Missouri River was run last week as far as Cedar City, Mo., and carried a party of officers. The track has been laid on the new road this year for about 100 miles to Cedar City west from Hamburg, the terminus of the Old Cleveland, St. Louis & Kansas City road, which was purchased by the company last year. The road runs along the north side of the Missouri River between Hamburg and New Franklin, Mo., where it connects with the present line of the Missouri, Kansas & Texas, and is about 134 miles between these points. The track is now being laid on the last 34 miles to New Franklin, and it is expected to complete the entire road by March 1 next. The road is being built by a construction company called the Southwestern Company, of which F. N. Finney, of Milwaukee, Wis., is Superintendent. Henry & Balch, of Minneapolis, are the contractors for the grading. R. P. Van Deusen is chief engineer, with headquarters at Jefferson City, Mo.

Missouri, Kansas & Texas.—The track laying on the line into Houston, Tex., which has been heretofore carried on entirely from the western end of the line, was commenced this week on the Eastern Division at Eureka, where a junction is made with the Houston & Texas Central road, and about five miles from Houston, Tex. The track on the western end has been laid from Boggy Tank, the former terminus of the branch east a distance of about 57 miles to a point near Sealey, but further progress from that end of the line has been delayed on account of the high water in the Brazos River. The Houston line, when completed, will be about 156 miles long extending from Taylor on the main line. Of this 89 miles is part of the old Taylor, Bastrop & Houston road, and 67 miles is the new road built in 1892 and 1893. The branch from Smithville on the main line west to Lockhart, Tex., which was built last year, is now in operation. The new branch is 36 miles long, and connects at Lockhart with the old San Marcos Division, which formerly did not connect with the main line. Burkitt, Burns & Co. were the contractors for both lines. F. W. Fratt is Chief Engineer of the company in Texas.

Missouri Southeastern.—About three miles of the line were built by the company in 1892, with its own force between Zita and Aquila, Mo., and four miles additional is now under construction to complete the road into Bloomfield, Mo. Geo. H. Crumb is General Manager.

New Roads.—Samuel Coulter, of Portland, Or., has contracted with Millett & McKay, a Skagit County lumber firm, to build a standard gauge logging road and operate it from the Snoqualmie River, about 13 miles above Snohomish and about 4½ miles eastward, in order to open up about 3,250 acres of timber lands in Skagit County, Washington.

The Graham branch road referred to under this head last week as being built to reach the Goss coal mines in Bellefonte, Pa., is a short branch of the Tyrone & Clearfield Division of the Pennsylvania and was built to connect with coal openings operated by J. W. Cooke, of Bellefonte, Pa.

A number of Texas capitalists intend, it is reported, to form a company for the purpose of building a road from Eagle Pass to Brownsville, Tex., through the valley of the Rio Grande River.

It is again reported that the old project of a road along the top of the Palisades in northern New Jersey will be carried out. It will connect with the North Hudson Elevated, and run to the upper end of Bergen County. Among those said to be interested in the project are: George S. Coe, H. W. Banks, W. S. Opdyke, W. B. Dana, W. O. Allison, Robert de Forest, G. W. Farlee, Miles Tierney, A. Rusch, John Winterburn, Charles D. H. Cole and William E. Bond, of New York.

Niagara Junction.—This road is to be about six miles long, and is being built at Niagara Falls Village, N. Y., by the Cataract Construction Co., which is also building the Niagara Falls Hydraulic Works. The contractors are Mairs & Lewis, of 18 Broadway, New York City, and B. P. Smith, of Rochester, N. Y. About four miles of road is now under construction to connect with the Lockport branch of the New York Central & Hudson River road.

Norfolk & Western.—The following track was laid on this road in 1892: Kingston Branch, from a point on the Radford Division, near Christiansburg, Va., to Kingston mines, length, 3.6 miles; Big Tom's Creek Branch and spurs, from a point on the Clinch Valley Division, near Coburn, Va., to the coal lands of the Virginia & Tennessee Coal & Iron Co., total length, 4.6 miles; Russell Fork Branch, from a point on the Clinch Valley Division, near Virginia City, Va., to the mines of the Clinch Valley Coal & Coke Co., length, 2.8 miles; branch to the Norfolk Coal & Coke Co. mines, from a point on the Pocahontas Division, length, 1.1 mile; Pelters' Branch, from a point on the Roanoke Division, near Vesuvius, Va., to Murray mines, .75 of a mile; Indian Camp Branch, from a point on the North Carolina Division, near Austinville, Va., to the iron mines of the Indian Camp Mining Co., length 1.19 miles; and Durham Division, from a point on the Lynchburg Division, one mile west of Union Station, Lynchburg, Va., to a connection with the Durham Division, at Twelfth street station, length, 1.3 miles. The aggregate new mileage is 15 miles.

The grading has been completed on the Roanoke Belt Line, from the present end of track West Roanoke to a

connection with the Winston-Salem Division, length, 2 3/4 miles.

The House of Representatives this week passed the bill permitting the road to build a line into the District of Columbia.

North Fork & Mineral.—A charter for this road was filed in Fresno County, California, a few days ago. It is proposed to construct a road 10 miles long, to be used chiefly for lumber traffic from a point on the North Fork of the San Joaquin River, running northeasterly through Fresno County. T. Stewart White and Thomas Friant, Grand Rapids, Mich.; James Heden and Wentworth R. Birmingham, of Oakland; and Charles W. Mott, of San Francisco, are the incorporators. Thomas Friant is President, and T. Stewart White Secretary and Treasurer.

Oconee & Western.—J. W. Willis and G. H. Holdshouser have been awarded contracts for building the extensions of this road in Georgia, recently described in these columns. From Grovania terminus of the road to Hawkinsville, Ga., a distance of 13 miles, the road is graded. The uncompleted portion from Spring Haven to Dublin, the eastern terminus, a distance of eight miles, will be graded first, and then the part of road west of Hawkinsville will be completed. The road is a reorganization of the Empire & Dublin and freight trains are now running over the portion already built. Claud Estes, of Macon, Ga., is President.

Owensboro, Falls of Rough & Green River.—About three miles of track has been completed on the extension from Fordsville, Ky., toward Adam's Fork, leaving about four miles of track still to be built to complete that line. Thompson Brothers & Co., of Louisville, Ky., are the contractors. During 1892 a branch was built from Horse Branch south to Rough Creek, seven miles, and also about one mile at Owensboro, Ky., to reach a new terminal.

Perry County.—A recent report concerning the progress of the extension of the line from New Bloomfield, Pa., states that the track has been laid on eight miles, and the last four miles to Landisburg and Loysville, Pa., has been graded ready for the rails. The road is being built by day's labor, and apparently very little progress has been made the last few months, for nearly seven miles of track was laid last July.

Philadelphia Belt Line.—The northern end of track on this belt line at Philadelphia is now at Bridge street, Bridesburg, a suburb north of Philadelphia, and about 2 1/2 miles north of Allegheny avenue, Richmond. The road is now being built along the Delaware River water front to Princeton street in Tacony, two miles. The contractors for this trestle work are Armstrong & Printzenhoff, Philadelphia. D. Jones Lucas, Drexel Building, Philadelphia, is Principal Assistant Engineer.

Pickens.—The rails for this short road in South Carolina will be purchased immediately, and as soon as they are delivered at Pickens, S. C., the tracklaying will begin. The line has now been graded from Easley north to Pickens, nine miles, and the cross ties distributed and bridges built. There are three wooden trestles, the longest being 350 ft. long. The maximum grade is 138 ft. to the mile and curvature 40 deg. About \$20,000 in seven per cent. township bonds have been subscribed by Pickens and Easley, and will be payable as soon as the line is in operation. J. E. Boggs, of Pickens, S. C., is President.

Portland, Monterey & Gulf.—This company has been recently incorporated in Texas. The road as described in the charter is to begin at Portland, on the San Antonio & Aransas Pass road, and will cross the Nueces River at Shapshburg and reach the Texas-Mexican at Banquete; thence it will extend through Brownsville, cross the Rio Grande and extend to Monterey, Mex. The road will be 265 miles long.

Port Reading.—The first passenger train on this new branch of the Philadelphia & Reading was run over the line on Jan. 2 from Bound Brook, N. J., east to Port Reading, north of Perth Amboy, N. J. The length of the line is 20 miles, and most of the track was laid this year. Port Reading is the new coal terminal of the company on New York Bay, and is located between Seawaren and Carteret, N. J.

St. Louis & Eastern.—N. W. Irish, of Carlyle, Ill., has a contract for a 10 mile extension of this line from Glen Carbon to Marine, in Madison County, Ill., north of the line of the Terre Haute & Indianapolis road. R. P. Lotes has the contract for the timber work. William E. Guy, of St. Louis, is the President and Robert Moore is Chief Engineer.

Silver Springs, Ocala & Gulf.—The Plant Investment Co. has acquired a controlling interest in this road, which operates a line of 43 miles from Ocala to Inverness, Fla., where it joins the South Florida road, one of the roads in the Plant system, and also 32 miles of branches to Homosassa. Upon the completion of a link of about 60 miles now under construction between Dunnellon, on the Silver Springs, Ocala & Gulf road, and High Springs, on the Gainesville division of the Savannah, Florida & Western, the Plant system will control a continuous line from Montgomery, Ala., to Tampa, Fla. The phosphate mines on the above road, which have hitherto been solely dependent on Fernandina as an outlet for their large export business, will now have a shorter line to deeper water at Tampa.

Spokane Falls & Northern.—Five hundred men are at work on the extension from near Northport, Wash., to the international line, 10 miles. The road is being pushed toward the boundary line as rapidly as the winter weather and snow will permit, and the contractors will be engaged on the large amount of rockwork during the winter.

Stuttgart & Arkansas River.—About five miles of the line south of Dewitt, Ark., has been completed to a point called Darell. This line is projected south to Pendleton on the Red Fork branch of the Arkansas River about 20 miles, and the first eight miles south of Darell to Gillett, Ark., is now under contract and the work is making slow progress.

Tionesta Valley.—About seven miles of new road are now being built near Tionesta, Pa. In 1892 a line was built from Parish to Hill Run, Pa., three miles, and this is being extended to Sandy Creek, two and a half miles further. Another line is being built from Parish eastward to Hunter Run, five miles. The company is doing the construction work with its own men.

Ultima Thule, Arkadelphia & Mississippi.—About eight miles of the line has been built this year southeast of Dalark in Dallas County, Ark., to a point beyond Fairview, and the line is now under contract nine miles further to the Ouachita County line. The surveys were

made last year from the Ouachita County line to Millville, Ark., connecting with the St. Louis Southwestern, a distance of about 25 miles from Dalark. N. S. Woods, of Arkadelphia, is the Chief Engineer and is building the road.

Westchester & Long Island Tunnel.—The Westchester & Long Island Tunnel Railroad Co. was incorporated in New York this week, with a capital of \$100,000. The company will operate a tunnel road from a convenient point on Long Island Sound, in the town of Westchester, under Long Island Sound, to near College Point, Queens County, a total length of two miles. The directors are: Frederick Cook, Orange, N. J.; Henry M. Conover, Brooklyn; Everett R. Reynolds, New York; William J. Kelly, Edward J. Boyle, Brooklyn; Alfred N. Hehre, Hollis, N. Y., and George A. Hammill, Jersey City, N. J. E. R. Reynolds is General Manager of the Long Island road, and C. M. Jacobs is Chief Engineer of the company.

Western Maryland.—Nearly all the contract work on the extension of the Baltimore & Harrisburg to York, Pa., has been completed, and three miles of track has been laid from Porter's, Pa., to near Menges Mills. The extension is 14 miles long.

Wilkes-Barre & Eastern.—The track laying has been commenced on this road, which is under construction between Wilkes-Barre and Stroudsburg, Pa. The track is being laid from Pocono Summit, on the Delaware, Lackawanna & Western, a point about half way between the terminus, west toward Wilkes-Barre, Pa. The line under construction is 65 miles long. W. P. Ryman of Wilkes-Barre, is President, and R. H. Talcott, of New York City, is manager of the construction company.

Yakima & Pacific Coast.—The bridge across the south fork of the Willapa River near South Bend, Wash., was completed in the last week of December, and the track was laid into South Bend on the Pacific Coast, the terminus of the branch, before Jan. 1. The road is a branch of the Northern Pacific, and its total length is about 86 miles from Chehalis, Wash., west to South Bend, of which 37 miles were built in 1892. Griggs & Huestis, of Tacoma, Wash., were the contractors. The road will be opened for regular freight and passenger business this month. An important work has been done at South Bend in deepening the Willapa River, and the channel in front of the company's terminals has now a depth of 26 ft. at mean low tide.

GENERAL RAILROAD NEWS.

Central of Georgia.—An attachment for \$1,213,405.29 against the Central Railroad & Banking Co. of Georgia was obtained from the Supreme Court in New York this week in favor of the receivers of the Richmond & Danville, for money expended for the defendant Central of Georgia, in discharging the accrued interest on defendant's mortgage bonds and in paying other obligations between December, 1891, and March 30, 1892.

Central of New Jersey.—The withdrawal of this road from the Reading combination has been completed by the cancellation by mutual consent of the lease between the Central and the Port Reading Railroad companies and the tripartite agreement between the Central, Port Reading, and Philadelphia & Reading. Even should the New Jersey Court of Appeals decide in favor of the legality of the lease and tripartite agreement, the contracts will not be renewed on the same terms. The result of the combination has been a disappointment to the Central of New Jersey. President McLeod has from various causes found it impossible to give to the Jersey Central the business that was promised, and the company has been a gainer only to the extent that prices for coal have been better sustained. It has now on hand unsold a very much larger amount of coal than when it entered the combination.

At Trenton, N. J., Jan. 11, Chancellor McGill, on the suit of the state which has been pending for some time, ordered the appointment of a receiver for the road. He decided, however, that since the counsel of the company have asked permission to show the company's complete severance from the Reading, a master will first be appointed to ascertain whether there has been a change of the status since the case was argued, and the appointment of the receiver will not be made until the master reports. The Chancellor decides every point in the litigation of the state against the Reading coal "combine" in favor of the state. The Attorney-General's contention that the court has power to appoint a receiver in such cases as this is sustained. The other points settled by this opinion are that the Central is responsible for the action of the Lehigh & Wilkes-Barre Coal Co., and that the injunction granted when the lease to the Reading was declared void has been violated by the coal company in arbitrarily fixing the price of coal by combination with the Reading.

Columbus, Hocking Valley & Toledo.—The annual report shows gross earnings of \$3,370,001; operating expenses, \$1,805,835; net earnings from operation, \$1,564,166; ratio of expense to earnings, 53.58 per cent.

Dutchess County.—Willett Hoysradt, of Poughkeepsie, N. Y., was appointed last week receiver of the road. The line was built in 1891 and extends from Poughkeepsie to Hopewell Junction and connects the Poughkeepsie bridge lines with the New York & New England railroad.

Panama.—This road has practically passed out of the control of the receiver of the Panama canal company. A cable from Paris says that the canal company owned 68,534 shares of Panama railroad stock out of the total 70,000 shares. These 68,534 shares are not in the possession of the receiver, M. Monchicourt. They are held chiefly by two individuals. Paul Arthur Cheramy holds 30,510 shares. M. Hyronimus holds 37,000 shares and M. Boudet is in possession of 1,021 shares. The shares held by Messrs. Cheramy, Hyronimus and Boudet came into their possession as security for the contractors on the canal works of the Isthmus.

Gen. John Newton, President of the road, says that the directors have chartered two American vessels to form an American line between New York and Colon; that an extensive movement of the citizens of San Francisco has resulted in the organization of a company of American steamers to ply between San Francisco and Panama and that the road will give these boats such facilities as it profitably and legally can.

Providence & Worcester.—An adjourned meeting of the stockholders was held at Providence, R. I., Jan. 7, and the amended lease of the property to the New York, New Haven & Hartford adopted without opposition. The changes from the original lease to the New York, Providence & Boston are only minor.

TRAFFIC.

Traffic Notes.

The New York Chamber of Commerce has passed resolutions favoring the legalizing of traffic pools.

The Adams Express Co. has withdrawn from the lines of the New York & New England, being succeeded by the American.

A meeting of the lines in the Southwestern Railway & Steamship Association has been called for Jan. 23, at St. Louis, to discuss plans for the permanent reorganization of that association.

Passenger representatives in Trans-Missouri association territory have arranged for the handling of rates through "The Trans-Missouri Westbound Passenger Rate Committee," with headquarters at Kansas City. T. J. Anderson, of the Rock Island, is Chairman, and C. S. Stebbins is Compiler of Rate Sheets.

Chairman Vining, of the Trans-continental Association, has given notice that the active work of the association ceased Dec. 31, and the chairman will close up the affairs of the association not later than Feb. 28; duties of the office in the meantime to relate only to the adjustment of accounts prior to Jan. 1.

Of the 87,724,877 bushels of grain received in New York in the calendar year 1892, 61,986,210 came by rail, 25,384,870 by canal and 343,792 by coast and river. The following table giving the percentages for the past seven years shows the rapid increase in the proportion carried by the railroads:

Year.	Canal.	Rail.	River and coast.
1892, per cent.	28.95	70.06	0.99
1891, " "	28.75	67.17	0.08
1890, " "	48.61	51.02	0.34
1889, " "	55.29	44.03	0.63
1888, " "	57.02	40.85	2.13
1887, " "	61.51	37.99	0.47
1886, " "	57.12	41.88	1.00

Chicago Traffic Matters.

CHICAGO, Jan. 11, 1893.

Following closely upon the termination of the existence of the Trans-continental Association, the Southern Pacific has put in effect the reduced rates eastbound which it endeavored to obtain consent for during the life of the association. A proposition was made by that company in July last to be allowed to make a rate of 50 cents per 100 lbs. on canned goods, wine, borax and beans from Pacific Coast terminals to New York, Chicago, St. Louis and New Orleans. At that time none of its connections would agree to the rate, and an appeal was taken to the Commissioners of the Western Traffic Association. They refused to allow the rate, application for which was made on the ground of clippership competition. The Southern Pacific now makes the rate effective from California to New York, and also puts in a rate of 65 cents on brandy. The eastern connections of that company, being unwilling to join in as low a rate to Chicago, the result was a higher rate to Chicago than New York. The Santa Fé promptly met the rate on all the commodities except brandy from its Southern California stations to Chicago, and has now announced a reduction in dried fruit to \$1 per 100 lbs. All the reductions are about 50 per cent. The Union Pacific and Northwestern are not willing to join the Southern Pacific in protecting Chicago, but it is announced that the Rock Island will, provided the traffic comes over the Rio Grande. Reductions in other commodities are probable, and unless the matter is patched up, which does not seem likely at this writing, trans-continental rates are liable to become demoralized in both directions.

The Live Stock Weighing Association has agreed to the application of the present minimum on stock cars of 33 ft. 6 in. to cars of 33 ft. 9 in.

The eastern lines forming the Mackinaw route have complied with the order of the Commissioners and have withdrawn the differential eastbound rates on flour in effect via that route. No action on the part of the Kewanee route lines has yet been announced.

The committee on revision of the Western Passenger Association agreement are again in session this week. It is likely to be three or four weeks before they will be ready to report.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Jan. 7, amounted to 92,823 tons, against 69,570 tons during the preceding week, an increase of 26,253 tons, and against 144,545 tons during the corresponding week of 1892. The proportions carried by each road were:

Roads.	W'k to Jan. 7.		W'k to Dec. 31.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	14,763	15.9	10,388	15.6
Wabash	6,353	6.8	4,963	7.5
Lake Shore & Michigan South	12,956	14.0	9,161	13.8
Pitts. Ft. Wayne & Chicago	7,771	8.4	6,073	9.0
Pitts. Cin. Chicago & St. Louis	10,970	11.8	7,769	11.7
Baltimore & Ohio	5,149	5.3	3,075	4.6
Chicago & Grand Trunk	13,285	14.2	7,331	11.0
New York, Chic. & St. Louis	9,407	10.1	7,707	11.4
Chicago & Erie	9,586	10.3	7,592	11.4
C., C. & St. Louis	2,653	2.9	2,626	4.0
Total	92,823	100.0	69,570	100.0

Of the above shipments 8,837 tons were flour, 49,432 tons grain and millstuff, 11,054 tons cured meats, 12,871 tons dressed beef, 2,697 tons hides, and 4,680 tons lumber. The three Vanderbilt lines carried 40 per cent.; the two Pennsylvania lines 20.2 per cent. The lake lines carried 181 tons.

The Interstate Commerce Commission.

The Commission, in an opinion by Commissioner McDill, has announced its decision of the case of the Minneapolis Chamber of Commerce against the Great Northern Railway and others, involving rates on wheat from North and South Dakota points to Minneapolis and on flour from Minneapolis to Duluth and other Lake Superior ports. The Commission declines to go into the question of the legality of the flour rate and says: "Rates on wheat from points in North and South Dakota to Minneapolis, as compared with the rates charged over considerably greater distances from the same points to Duluth and adjacent Lake Superior ports, subject Minneapolis millers to undue and unreasonable prejudice and disadvantage. The defendants are ordered to adjust their rates on wheat from said points to Minneapolis and Duluth upon the basis of distance over nearest practicable routes." Further points in this decision are given in the editorial columns.